RAILROAD GAZETTE

FRIDAY, FEBRUARY 20.

Terminal Facilities of the Pennsylvania Railroad at New York.*

The freight business of this road is divided into *main-line freight*, on the Pennsylvania Railroad proper (New York to Pittsburgh and branch lines); *Western freight*, on lines which it controls north and west of Pittsburgh and Erie—this business is managed by the Union, Empire and Anchor fast freight lines; *Southern freight*, on the lines which it controls south of Philadelphia; and *Eastern freight*, between New England and points on the Pennsylvania Railroad system generally. For this latter business New York is a transfer and not a terminal station.

The Pennsylvania Railroad connects with and operates several distinct lines in the vicinity of New York, and as the only means of communication with the city is by water transportation from the New Jersey shore, the terminal freight stations and yards of this railroad system are numerous and widely scattered. They are:

In New Jersey: First, the terminal yard and shops at the Meadows. Second, the through western freight station and transfers, the grain elevators and the stock yards and abattoir, all at Harsimus Cove, Jersey City. Third, the main line freight station and transfer and the Red Star and Netherlands steamship docks, adjoining the passenger station, at Jersey City. Fourth, the oil yard at Communipaw. Fifth, the coal docks of the Amboy Division at South Amboy.

In New York City: At five separate localities on the Hudson River docks are six freight stations used for the local freight business of the city.

In Brooklyn: At Williamsburgh is a freight dock used largely for the shipment of sugar from the Brooklyn refineries.

On the Harlem River there is a transfer for eastern freight, and also one *on the Hudson River* at Fishkill.

TERMINAL YARDS AT THE MEADOWS.

The first available site for a yard west of Bergen Hill is where the grade of the railroad descends to the level of the marshy land west of the Hackensack River (about four miles from the Hudson River), on the long and narrow strip lying between this railroad and the Delaware, Lackawanna & Western Railroad.

The construction was begun about 1872, and the yard was first used in 1874. The site, formerly under water, had been reclaimed by a dike. The surface was properly ditched, cribs sunk where necessary, and gravel brought in by train. The bank being very light, there was little disturbance of the original surface. The plan (fig. 1 on our double-page illustration) shows the general arrangement of the yard. The three-throw switches there indicated are made of two No. 8 rail frogs and one No. 10, with upright stands; they work well. The grades, following the surface of the ground, are light, and neither materially help nor retard the work of drilling. There are about 19 miles of available track in the sidings.

Operation: The engine from the incoming train from the West is detached at the west end of the yard, and the yard engine, on the adjacent track, by means of a pushing pole, cuts the train up; this is done according to destination, and, in a general way, as to classes of freight. Fast through freight is placed on the section of tracks marked "Merchandise Yard;" slow through and local on "Coal Yard." The yard engine then pulls them out on the northerly track to the different Jersey City yards, bringing back empty cars, which are placed on the tracks marked "for empty cars." This work generally requires, night and day, four engines in the yard and two running to Jersey City. With this equipment, in the year 1883 there were received 214,863 loaded cars of all kinds from the west, and 151,592 were forwarded west from Jersey City and from this yard.

The following is the organization at this yard. It applies generally to all yards, except that it varies in the numbers according to the size of the yard and the work done:

	Day.	Night.
Yard-Master	1	1
Assistant Yard-Master, East-bound freight	1	1
" " West-bound, freight	2	2
" " local freight	3	0
Yard clerks	4	2
Car record clerks	2	2
Lock and seal clerks	2	2
Weigh clerks	1	0
Coal clerks	1	0
Watchmen	2	2
Switchmen	..	..

Each of the six engines have the following crew, night and day: 1 engineer, 1 fireman, 1 conductor, 1 flagman and 2 brakemen.

HARSIMUS COVE TERMINUS, JERSEY CITY.

This (fig. 2) is on the Hudson River, about 1,200 ft. north of the Jersey City passenger and freight yard. It has a double-track connection with the main line, about one mile long, built on trestle-work. The elevator, instead of being on its own pier, is located inland between the piers, with its end only towards the water, on account of the scarcity of water front controlled by the company, and also to enable ocean steamers to lie along the pier and receive grain by the conveyers and merchandise from the freight pier at the same time. There was also a rock foundation at its present site.

The tracks were formerly built on trestle-work, but when the new work was done in 1880 they were filled in with street refuse from New York, top-dressed with ashes. This material was cheap and light in weight, causing little disturbance of the silt lying on the rock bottom, which dips rapidly towards the river. The tracks keep in excellent shape, are laid of new material, and are generally 11 ft. between centres. The switches are almost entirely single-throw, split switches with steel coil springs; the frogs are No. 8 and No. 6 rail. There are 14 miles of track in the yard.

The construction of the piers and freight houses is indicated on figs. 3 and 4. The sides are corrugated iron; the roof gravel; the piles are not driven to the rock; they are about 80 ft. long, and are not spliced, nor pointed, but driven with a square end down. The freight houses are neatly whitewashed inside and kept very neat. The following are some of the particulars of the size and cost of these sheds:

Floor area of new shed pier No. 2 (see fig. 3):		
First floor, North platform	32,000	sq. ft.
First floor, South " West-bound	11,000	"
Total	43,000	"
Second floor, North platform	31,000	"
South "	9,000	"
Floor area, total	40,000	"
Old Shed, North platform	54,000	"
South "	16,000	"
Floor area, total	70,000	"
Pier No. 3, shed (see fig 4):		
8 ft. centre to centre of pile bents.		
16 " " " house sections.		
32 " " " side doors.		
7 ft. × 8 ft. size of upper doors.		
11 ft. × 12 ft. size of lower doors.		
Area, 2 lower platforms, each 35,000 sq. ft.	70,000	sq. ft.
2 upper " " 30,000 "	60,000	"
	130,000	"

Cost of shed, about 90 cents per sq. ft. of total area of lower floor.
Cost of pier, about 100 cents per sq. ft.

The grain elevator, the plan of which is shown by fig. 5, was built in 1879-80, and is constructed of heavy timber framework, founded on rock from 12 to 26 ft. below the surface. The foundation of each post is a separate pier; the coffer dams used in the construction generally inclosed four piers. The boxes or legs in which the elevators work are of boiler iron, and are shown in black with white figures in the plan; the weighing bins and spouts are of iron; the sheathing of the sides of the building is corrugated iron. Those parts of the framework lying under compression are oak. The engines are situated on the bin floor, 90 ft. above the ground; they consist of two pair of double engines, making in all four cylinders, 20 × 24, running four 48 in. driving belts, and are of 100 horse-power each. The weighing bins are in pairs, two to each scale; the capacity of each bin is 36,000 lbs Each was intended when the elevator was built to hold a carload, enabling the scales to be kept constantly at work. The contract price of the building was $450,000.

Operation of the Yard: The yard engines at Harsimus Cove receive the trains from the Meadows engine and sort them more thoroughly on the tracks marked *K*. Freight from and to transfer bridges are put on *W* and *E* respectively; for the elevator on *G* and empty cars from the elevator on *F*; Piers 1 and 2 freight on *P*. The part marked *R* is the freight yard under the charge of the local agent. (The freight is here delivered directly to the city drays.) West-bound freight is hauled directly from this yard, and does not stop at the Meadows. The track scales are at *S*, the water stand-pipe at *C*. There is no coal platform; the engines are coaled by shoveling from the cars. Five switch engines are employed, two constantly at the transfer bridges work; the pier freight houses generally require two and sometimes three shifts a day. The general grade of the yard falls slightly towards the river, and, especially at the head of the yard, materially aids the work of drilling.

Operation of the Elevator: Before the cars loaded with grain enter the elevator, the agent of the Produce Exchange inspects and "grades" each car-load; this is done in the yard. The cars are then run into the house and the contents elevated, weighed and run into the bins, where the grain is stored according to grade and not according to owners. The business of the elevator, as is usual, consists of handling the grain, storage and cleaning. The cleaning is only done when requested by the owners; it is done by blowing a stream of air through the grain after it leaves the weighing bins. It is then elevated again and again weighed, the dirt falling to the ground floor. The charge for this work is one quarter of a cent a bushel. A regular charge is also made for storage of certain kinds of grain after a period agreed upon, generally ten days. The weighing and general methods are those usually employed in receiving and delivering grain in elevators, except that as the grain is delivered by belt conveyers, the bins are all operated alike, none being exclusively devoted to shipping nor to transfer. They all receive and all deliver, and the transfer from one bin to another is made by spout, or when necessary by belt. These endless belt conveyers run horizontally from end to end of building on the bin floors; they are made of rubber, are 36 in. wide, and each one of the six in use can carry 8,000 to 10,000 bushels an hour. Grain is lifted from the bins, runs through an adjustable sheet-iron spout, and falls on the top or carrying portion of the endless belt, which runs at a rapid rate towards the river, and at the return of the belt the grain (which is spread on the belt in a layer about 3 in. deep) shoots forward and runs down the sheet-iron spouts extending from the shore end of the building. Three of these spouts lead to the bulkhead, where there is sufficient dock room for small boats—such as canal boats, which are used as grain lighters. Six spouts lead to the long gallery belts, the position of which is shown in the plan and section of the freight sheds. These gallery belts convey the grain to large boats lying along the piers. For the purpose of delivering the grain at several points along the pier the upper or carrying part of the belt is raised, at any point desired, by a loose roller mounted on a movable iron frame about 4 ft. high, and as the belt falls by its own weight away from the roller, the grain shoots ahead in the upward direction in which it was traveling and falls into a box made with one spout on the side and one in front, over the belt.

In the box is a movable partition which separates the grain in any desired proportion, one portion falling through the side spout into the sheet-iron tubes which carry it to the vessel, and the remainder falls through the front spout upon the belt and is carried along by it to another delivery spout. These belts are operated by independent 30 horse-power engines working at the shore end of the galleries.

It requires 20 tons of coal a day to operate the entire elevator working at an average rate, and 13 tons when work is slack. The capacity for receiving and delivering grain in this elevator with 24 legs and six belts is very great; indeed the size of the yard and the movement of cars is more a measure of its work than its own capacity. A good average of continuous work has been 100 cars a day, though over 200 cars are sometimes unloaded in one day, and 156 cars were lately unloaded here in the forenoon with six gangs of shovelers; but the rapidity of the work somewhat depends on the character and condition of the grain. The storage capacity is about 1,500,000 bushels. 9,000,000 bushels of grain were delivered by this railroad in 1883.

Organization: The working organization of the elevator is as follows:

1 Superintendent and clerks;

1 General Foreman over all workmen, and with him 1 car record clerk and 1 shipping clerk;

1 Master Machinist, who has special charge of keeping all machinery in repair, and under him 2 assistants on repair work and 3 oilers;

1 Wharf-master, who provides boats and directs their loading, and who has charge of the trimmers;

On the Track Floor: 1 Foreman of shovelers, and under him 12 laborers at the shovels and 2 opening cars;

On the Bin Floor: 1 Foreman and 2 men setting spouts, etc., under general direction of the weighman on the floor above; 1 engineer-in-chief, who runs one main engine and has oversight of the engineers who run the other engines; also over the firemen, of whom there are 2 during the day and 1 at night;

On the Scale Floor: 1 Chief Weighman, who weighs all grain coming into the house and directs its distribution; 2 assistant weighmen, who weigh the grain shipped from the house;

In the Galleries: 1 Foreman, with 3 men, who attend to the loading and unloading of the delivery belt, and 1 man to attend to the three small engines which run the gallery belts.

Operations of the Piers in General: The piers at this place are almost entirely used for the lighterage business of through Western freight, moved in car-load lots, of freight coming from the west, flour for instance, to be lightered to a ship for foreign export, or to storage warehouses located on the water; and of freight going to the west, sugar for instance lightered (or transferred directly) from ships, or from manufactories and warehouses; in this way saving the hauling to the railroad freight stations in New York. This through business is under the management of the fast-freight lines, which are organizations of agencies managing that portion of the western business of this railroad system which extends over lines connected with, or controlled by, but not operated by the Pennsylvania Railroad proper.

All transfers to or from large ships are done at these piers, whether on main line or Western business hence, although for the sake of proper operation the business at Harsimus Cove is mostly confined to fast-freight line business. It is not exclusively so, nor is the loading entirely done in fast-freight line cars, though considerable effort is made to do so. This is desirable in order to keep cars running in certain beats, one class for long and one class for short hauls, for in railroad management constant effort is made to attain in all things a systematic operation of business, classified in character and concentrated in location, and just how far this can be profitably done is a subject of constant thought and experiment.

Except the hydraulic elevators hereafter mentioned, there is no stationary machinery for loading, unloading or moving freight on any of these piers; the only machine for moving it is the hand truck. Two lighters, used for freight requiring quick delivery, have both steam-hoisting and propelling apparatus; a few have steam hoists and are moved by separate propellers, but most of them have only the gaff boom and hand drum. These are operated either by hand or by an independent boat carrying a steam hoist especially for this purpose, or by one on an idle lighter alongside.

The unloading of ships and independent lighters is done by city stevedores, and not by the railroad company.

The approximate daily work at the freight houses on these piers is 145 loaded cars of east-bound freight and 50 cars of west-bound, requiring about 225 truckmen and tallymen for handling the freight.

Operation of Pier No. 1: This is not covered and is used for the direct transfer of such freight as building material, machinery and iron manufactures, which do not require storage, inspection, or piece-weighing, but are directly transferred by lighters to destination. There is no platform and the cars are seldom loaded here with west-bound freight.

Operation of Pier No. 2: In the old freight house, marked *D*, "wet" freight, such as bacon, sugar in hogsheads, and cotton, copper matte and other merchandise in car-load lots requiring weighing, inspection or temporary storage, is handled to and from the cars. In this house the weighing is done on movable scales. The wide platform between the water and the track is mostly used; the other platform is out of the way for lighterage business and more convenient for transfer to cars on the track on the south side. The new shed, marked *A*,

* The illustrations will be found on the large inset.

Fig. 1.

PHELPS INDUCTION TELEGRAPH—EXTERNAL VIEW.

has two stories and is mostly used as an export flour depot. On the wide platform are three hydraulic elevators, 8 ft. × 8 ft., capable of lifting 22 barrels, but generally lifting 16. They work excellently in summer, but the water freezes in the pipes under the wharf in winter, and steam-power is being substituted. The narrow or south platform is used for general transfer from lighters of merchandise moving west, such as imported wire or sugar from the refineries, the only difference in operation being that local freight must give way to fast through freight. There are three stationary platform scales on this platform, as shown on the plan; they are placed between the doors.

Operation of Pier No. 3: This house is devoted to dry freight, such as flour, oil cake, machinery and boxed groceries. The second floor has not yet been used. The uncovered portion of the end of the pier is used for transfer between ships and cars of certain freight, as imported lumber, which may be left exposed if the transfer cannot be made at once.

Operation of the Transfer Bridges: Freight shipped eastward for use or sale in New York and westward from New York merchants in car-load lots, or less, is not lightered across the river as it was before 1866. The cars themselves are now carried across on barges or floats, which generally have two lines of track and hold ten cars, five on a side, with a raised platform between the tracks. The transfer bridges by means of which the cars are run on and off these floats are Howe truss bridges, 100 ft. long, hinged at the shore end and suspended by heavy iron chains from a stationary framework near the river end. They are thus, by means of the chains, which run over large sheave wheels above, and are worked by hand gear below, made adjustable to the stage of the tide and the load on the float. These bridges are located at *A* and *B* on the plan. The through New England freight is also transferred over these bridges to three track floats holding 14 cars, and having no platform in the centre. This business amounts to about 150 cars a day. Coal for New England is also transferred over these bridges to large floats holding 20 cars, which are towed to Fishkill-on-the-Hudson, about 60 miles up the river.

JERSEY CITY TERMINUS.

This (fig. 6) adjoins the passenger station on the north. It is the original yard, where the whole business was formerly moved. It is short and wide, and has been developed, or spread out like a fan, from the narrow entrance at the head. At the busiest point in the yard there is a dangerous crossing of a city street, which is guarded by six men with flags.

The track is furnished mostly with three-throw switches. There are five miles of available shifting tracks in the freight yard.

The sheds on the piers are ordinary one-story wooden sheds, with a wooden truss roof. The sheds are covered with corrugated iron on the outside, and are neatly whitewashed on the inside.

The transfer house marked *T* is an ordinary temporary shed inserted on the only spare room in the yard. It is built between the tracks without a platform on the outside, and hence the cars frequently require shifting so as to make the car-door correspond with the door of the house. This would not be necessary if there was a platform on the outside, or if the house covered the tracks as well as the platform between them.

Operation of the Yard: There are four engines in use here, night and day, one of them constantly on the transfer bridge work. Each engine has one day's rest for cleaning in the week, only two working on Sunday. The cars which go to the docks of the Red Star and Netherlands lines of steamers are hauled by horses. West-bound freight from the transfer bridges is placed on tracks marked *W;* east-bound on tracks marked *E*.

Operation of the Piers in General: This is similar to that at Harsimus Cove, and is devoted to the lighterage business of car-load lots of main line and southern freight. The west-bound freight lightered from ships, storehouses and factories is much heavier than sometimes twice the east-bound freight, hence a separate house is devoted to it. A small quantity of through western freight is moved at these docks, as there is a derrick here (*L* on plan) of large capacity, and there is nothing of the kind at Harsimus Cove. There is no steam or hydraulic machinery used here; but there are some small hand derricks on the north side of Pier *E*. The freight is moved in the house by ordinary hand trucks, excepting hogsheads of imported sugar weighing 2,000 lbs. and over, which are moved by special iron-frame trucks, by means of which three men can truck them instead of rolling them. Also in the New England transfer house, where a great variety of merchandise is handled, there is an ordinary four-wheel truck without a handle, about 8 in. square and having wheels 4 in. in diameter, which is found very useful for moving boxes, either too heavy or too bulky for the ordinary hand truck. At these piers can be seen the loading of what is called the "fast local freight" on the Pennsylvania Railroad. This is a service induced by the competition of the Philadelphia & Reading system west of Lancaster. The packages are very carefully loaded in the cars, the first to go in being the last to come out. The train is run on fast time, and by having a few additional train hands, the delivery is quickly made.

The daily work here is about 90 cars west-bound and 60 cars east-bound, with 125 laborers, etc., and about 50 cars at the New England transfer with 18 laborers.

Operation of Pier F: This is used for the transfer of west-bound freight from lighters. Freight is hoisted from the lighters and trucked and piled on the platform, or trucked directly into the cars. There is not much storage required here, and a large part of the shed is devoted to track room, three tracks running the whole length of the building, as shown on the plan.

Operation of Pier D: This is used for the transfer of east-bound freight to the lighters. The northern part is uncovered and the transfer is made direct as at Pier No. 1, Harsimus Cove. The southern portion is covered and is used for temporary storage and inspection. By a rule of the Produce Exchange the railroad companies are obliged to give five days' storage to flour for inspection, and therefore much space is devoted to this at all the docks where flour is handled.

Schedule of Plan No. 6.

Area of Platform on Pier	East-bound freight. D, 19,000 sq. ft.
Area of Platform on Pier	West-bound freight. F, 8,600 sq. ft.

Operation of Transfer House: The cars are loaded on the New England roads with freight mixed as to destination on the Pennsylvania Railroad system. These cars are placed on each side of the transfer sheds at this place; the freight is then taken out and sorted on the platform according to destination and reloaded in the same cars. It is simply a sorting process of the freight, and is not intended to regulate the car service any more than that the cars are reloaded so as to go as near home as possible. There are similar transfers at Mantua, where the main line and southern freight divide, and at Pittsburgh for the different western lines.

Operation of Transfer Bridges: This is exactly similar to that at Harsimus Cove. Eastern freight transfer is done mostly by a side-wheel steamer having two tracks, each holding seven cars. Both passenger and freight trains are transferred on this boat. It makes four trips a day with freight. The largest work done over these bridges is transferring cars to the floats for the New York docks, about 150 cars every day.

GRATZ MORDECAI.

(TO BE CONTINUED.)

The Phelps Induction Telegraph.

A great annoyance in the working of telegraph and especially telephone lines has been, and indeed is now, the phenomenon called *induction*, which is the property which an electrical current, flowing through one conductor, has to set up an "induced" current in any parallel conductor within its "magnetic field," without any physical contact between the two. This magnetic field extends to a considerable distance on each side of the conductor, and the consequence is, often, that the receiving instrument of a telephone either transmits nothing more than a confused hum or transmits matter never intended for that destination. An instance will better illustrate the nature of the phenomenon: The wire over which the first telephonic communication between New York and Chicago was held chanced to run parallel with and about 7 ft. away from a private telephone wire a mile long. A gentleman attempting to use the latter one morning was astonished to hear in his telephone the words "Hallo, Chicago," and a long subsequent conversation carried on between Chicago and Jersey City. This was possible, not because his instrument was in any way connected with the primary circuit, but simply through an *induced* current which was set up in his wire by the one 7 ft. away.

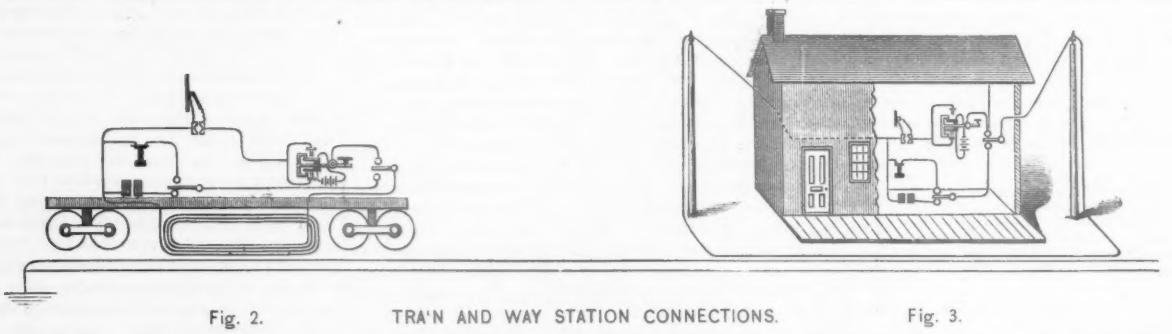


Fig. 2. TRA'N AND WAY STATION CONNECTIONS. Fig. 3.

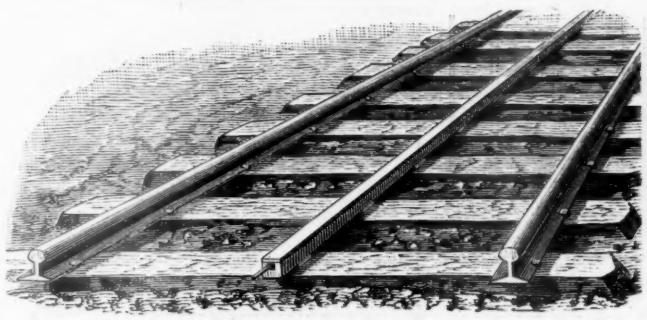


Fig. 4.
Line Conductor.

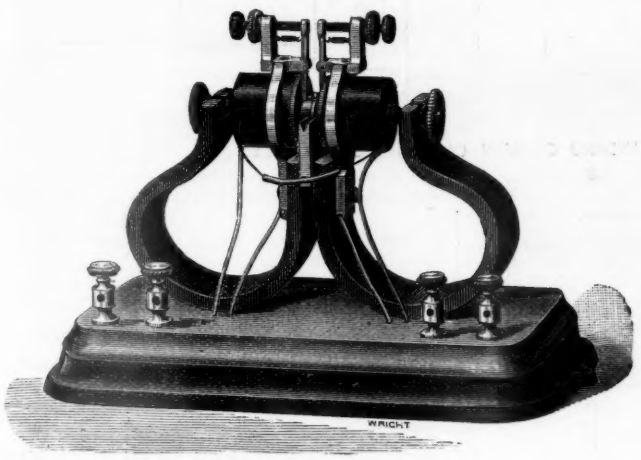


Fig. 5.
Phelps Polarized Relay.

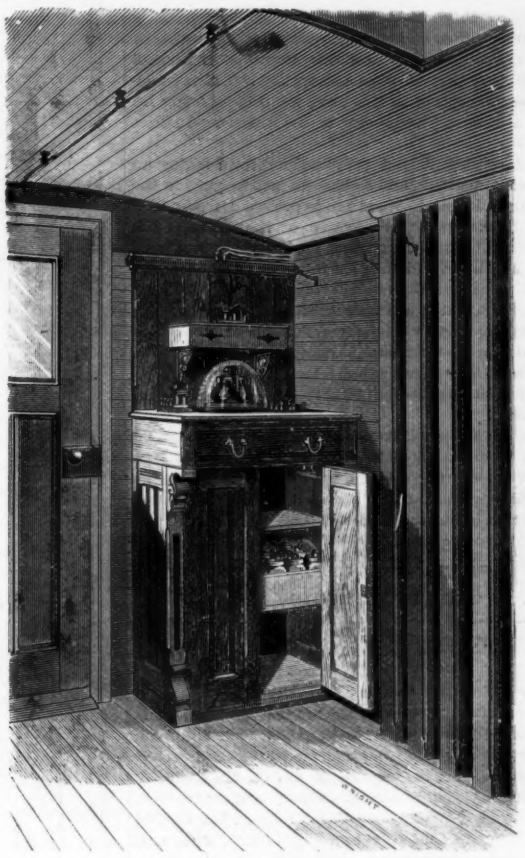


Fig. 6.
Train Instruments and Battery.

PHELPS INDUCTION TELEGRAPH.

The Phelps induction telegraph is an attempt to put to practical use this phenomenon by putting all trains in telegraphic communication with a central office, and even, if desired, with each other. The especial convenience of an induced current for that purpose lies in dispensing with all need for the physical contact of conductors, a necessity which has hitherto been a great obstacle in attempts in that direction, since it necessitates the use of bare conductors and involves other difficulties and complications. To produce an induced current nothing more is necessary than parallelism of a system of wires at a certain moderate distance apart, and a current through one of them.

The device in detail is as follows: A single insulated wire, No. 12 or larger, according to length of circuit, is placed in a grooved wooden trough, fig. 4, 2 in. square. This trough rests upon small 2 in. × 4 in. blocks, which have been "graded" to a uniform height below the rails by a simple machine. The trough is capped with a thin strip of wood, the joints of the strip being covered by galvanized iron strips so as to make a sufficiently water-tight connection. This protection, in connection with the insulation of the wire, is claimed to make the current far less liable to interruption by magnetic or other storms than ordinary telegraph wires. As a further protection, the two wires of a double-track line are connected so as to make a single "metallic circuit," and it is recommended that a metallic circuit be used even for single track. Any sidings desired can of course be included in this circuit, most conveniently, in pairs. The wire is carried under the rails of turnouts in short rubber tubes and through the planking of highway grade crossings in small gas pipe. The total cost is given as $250 to $300 per mile.

Through this wire a current of about 1½ ampères is passed, operated in the usual manner (so far as the operator is concerned) by a pole-changing key invented by Mr. Phelps.

The induction circuit on the car consists of 90 convolutions (more or less) of No. 14 copper wire, single braided and paraffined, so connected as to form one continuous circuit about 1½ miles long, the whole contained within a continuous rubber hose, 1½ in. in diameter. The lower portion of this hose and coil is carried in a 2-in. gas-pipe suitably stayed (see fig. 1) about 7 in. above the main track wire.

The upper portion of the hose and coil is carried up through the car to the roof, under or over which it passes. Fig. 2 represents the principle of the coil, but not its actual location.

The intensity of the induced current depends (1) on the number of convolutions and (2) on the length of the parallel portion of the coil. Therefore the coil is carried parallel with the track for as long a distance as possible between trucks, but when this distance is short the number of convolutions may be increased.

In this circuit is placed a delicate "polarized relay," which is the receiving instrument of the car and responds to every reversal of the polarity of the main current. A transmitting key, a sounder (on an elevated sounding box) actuated by a relay in the ordinary manner, and an ordinary "buzzer," are the other train instruments. The "buzzer," when the key is in use, serves to break the current very rapidly and cause a humming like that of a bee, which is broken up into Morse characters by the key.

Messages are received in the car, therefore, precisely as from ordinary circuits and instruments, so far as the operator is concerned. They may also be sent from the car in the same manner, but to do so requires as strong a battery on each car as on the main circuit. The company owning the patent, therefore, prefers to receive at the terminal station upon a telephone receiver, in which the Morse characters as produced by the key and "buzzer" on the car are very distinctly heard. By using an amplifier the characters thus received by telephone may be heard as distinctly as from an ordinary sounder in any part of the room, but it is believed that this will not in practice be found necessary or expedient.

By using the telephone receiver the battery on the car need consist of only five cells, one for the relay and four for the transmitting circuit. It is contemplated that every station as well as every train should be connected with the same central office under the same system, as shown in fig. 3, with or without other telegraphic facilities.

L. G. TILLOTSON.

It is found in practice that the induced current is sufficiently strong for practical working even when the coil and main wire are several feet apart, as when on parallel tracks. No difficulty of any moment is found to arise from the jarring and jolting of the car.

It will be seen that by this system, although the operator at the dispatching or other central office is in direct communication with every train and station on the line, and all calls from him are heard in every one of them, yet that messages and calls in the reverse direction, *i. e.*, going to the central office, are heard at the central office only. The useless sounding of the instrument is thus much diminished, increasing the probability that any call will be instantly heard, and as the sounder is sufficiently loud to be heard over the din of the train from 10 to even 30 ft. away, it is claimed that a baggageman or brakeman can attend to his other duties and yet give sufficient attention to the instrument.

The special advantages claimed by the company are these: That the circuit is much less likely to be interfered with by storms or other causes than the ordinary form; that train orders may be given to two or more trains simultaneously and accidents or stoppages of every kind (except a complete derailment) can be instantly communicated to headquarters and any needed help ordered; that a derailment or breakdown of the telegraphic apparatus reveals itself negatively by the absence of a report at the required fixed intervals; that it will greatly facilitate the transaction of business by officers travelling on the line and prove a considerable source of revenue, as well as a great accommodation to the public, by doing a general telegraph business; and that with a telegraph instrument on every train, all or most trainmen will by the time they become conductors, be sufficiently expert operators to receive their own orders at least.

These claims, if substantiated, certainly indicate a wide field of usefulness. The section which has been already constructed, 12 miles in length, between New Rochelle and the Harlem River, on the New York, New Haven & Hartford Railroad, has been in successful operation for some weeks past, working when other lines would not work on at least one occasion, and so far as we can judge from the statements of officers and employés of the line is regarded by them as in every way a success, so far as so short a test can be regarded as conclusive.

The Late L. G. Tillotson.

Mr. Luther G. Tillotson, who died at his home in New York, Jan. 31 last, was born in Ithaca, N. Y., March 1, 1834. At the age of 15, after receiving an ordinary education, he went West as assistant to his father, the late Daniel T. Tillotson, who in 1849 was appointed Secretary and Superintendent of the old Erie & Michigan Telegraph Co. There he soon became an accomplished telegrapher, and so mastered the details of the service that in 1853, at the early age of 19, he was made Superintendent of Telegraph of the Erie Railway, a position which he filled with much ability. He remained with the Erie for nine years, adding to his duties on that road the charge of a division of the Western Union lines.

Mr. Tillotson was fully impressed with the future importance of the telegraph system, and recognized the fact that with its growth would come a constantly increasing demand for the supplies used in building and working the lines. He determined to take advantage of this, and in 1862 left the Erie road and began business in New York as a dealer in telegraph and railroad supplies, under the firm name of Tillotson & Co. From the first he was successful, and on Nov. 1, 1865, the present firm of L. G. Tillotson & Co. was formed, his partners being Gen. E. S. Greeley and Mr. W. H. Holt. Mr. Holt, however, retired in 1866, leaving Messrs. Tillotson and Greeley, as they have since remained, the only members of the firm.

From that time forward Mr. Tillotson's time was entirely devoted to his business, and it was his chief ambition to put his house at the head in its line of business, and to keep it there. He

recognized thoroughly that the essential principle of business life is constant growth, and no improvement in apparatus or methods of manufacture escaped his attention. Although often asked to take part in other enterprises, he always declined, the only exception to this rule, we believe, being his service for a time as a director of the American District Telegraph Co.

This rule, however, did not prevent him from taking an interest in public matters, and he had an active part in the movement started some 15 years ago to present a testimonial to Professor Morse, and in the erection of the statue of the great inventor in Central Park, New York.

The pride which Mr. Tillotson felt in his extensive and successful business, and his thorough devotion to it are well illustrated by the fact that it was his earnest and express desire that his surviving partner should continue the business without any change in the firm name. He married, in 1857, Miss Emma A. Glenn, who survives him; he leaves no children, their only child having died in infancy. He leaves a considerable fortune.

The connection of the telegraph with the railroad has grown so intimate that Mr. Tillotson necessarily had a large acquaintance among railroad men, with many of whom he had large dealings, and among whom he numbered many friends, to whom his death, almost in the prime of life, will be more than a passing sorrow.

Contributions.

Hart Foot-Guard: Correction.

CLINTON, Iowa, Feb. 10, 1885.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Jan. 30, under the heading of "Protecting Frogs and Guard Rails," you state the Old Colony Railroad are using wooden blocks in frogs and guard rails as a protection, and that these are the same as in use on the Boston & Albany Railroad. The Boston & Albany are, or were in August last, using old-fashioned wooden wedges, but the Old Colony then purchased the right to use the Hart foot-guard, consisting of oak strips bolted to each rail, and only filling the space between the head and base of the rail. I understand this is the guard the Old Colony is now using. It was illustrated in your issue of May 9, 1884. Perhaps a correction of this item will prevent railroad managers from being misled.

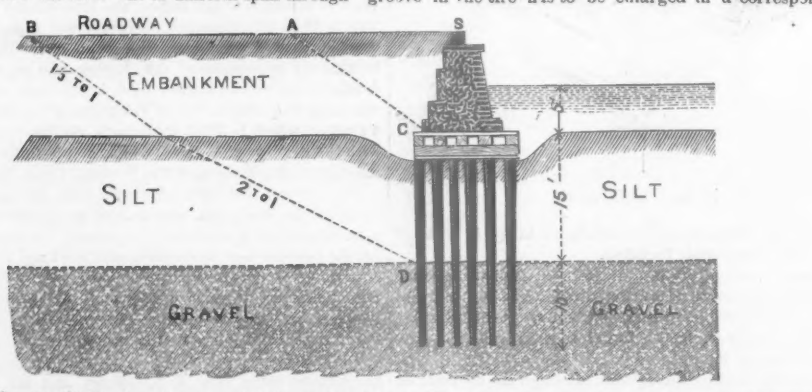
E. S. HART.

The Chestnut Street Bridge Foundation.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Some years ago I was called upon to examine an iron bridge, one of whose abutments was believed to be moving. The plans showed the condition of things to have been about as in the accompanying sketch, the amount of masonry in the abutment being slightly more than sufficient to withstand the thrust of the prism *SAC*. An examination of the masonry immediately behind the post-feet of the trusses, consisting of single stones extending from bridge seat to back of wall, showed that these stones had been pushed back several inches from their original line, or, rather, that the abutment had moved forward, leaving the back stones and the adjacent post-feet in their original positions. Careful observations, continued over several days, showed that this movement was continuous. The roadway on the approach to this abutment being already complete, it was not thought best to attempt a remedy at the back of the masonry, so the movement was stopped by placing a mass of riprap in front of it. The failure of the abutment was evidently due to the fact that, whereas provision was made against the pressure of the small mass *SAC*, the much greater pressure of the large mass *SBD*, less the slight resistance of the silt in front of the abutment, should have been provided for, either by carrying the masonry, properly proportioned, down to the gravel, or by providing a floor on piles at the surface of the mud to support the embankment.

An examination of the profile of the Chestnut Street Bridge, given in your issue of Jan. 30, shows a precisely similar condition of things to exist. In the spring of 1880, when the repairs of that bridge were commenced, I made examination of the western approach to ascertain the cause of its failure. Careful measurements of the spans of the small arches showed that the one nearest the river was of uniform span throughout its length, whereas the landward one varied in such a manner as to show that its west or landward abutment, which was badly cracked, had moved riverward. The abutment pier, supporting the iron arch, and the stone arch next to it did not reveal the slightest evidence of movement, and it is satisfactory to know that Mr. Lindsay's examination corroborates the accuracy of mine. In view of these facts, it is difficult to resist the temptation to believe that the iron struts now being sunk should have their direction reversed, and be pointed toward the embankment in the other bay, instead of toward the iron arches, which seem to have ample support already.



S. HASLETT.

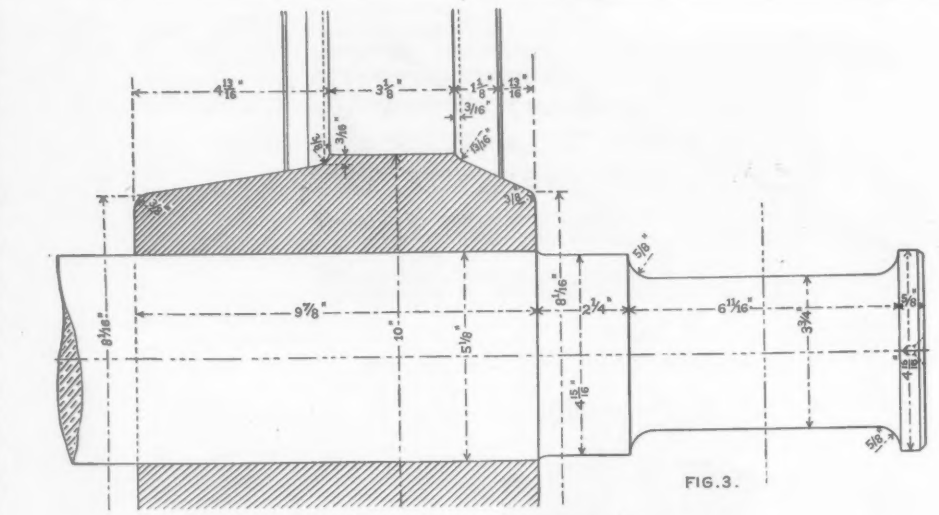
Standard German Car Wheel, Axle and Tire Fastening.

MUNICH, GERMANY.

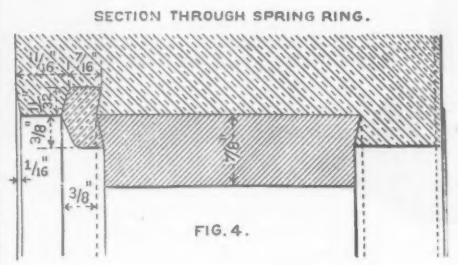
TO THE EDITOR OF THE RAILROAD GAZETTE:

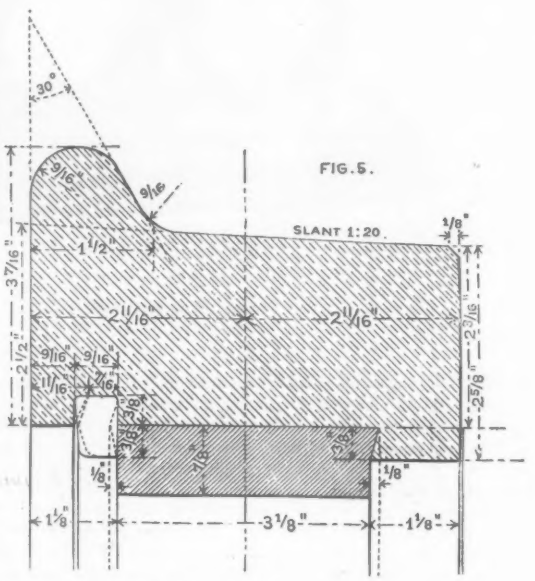
The accompanying engravings may be interesting to your readers in view of your recent illustration* of the English spring ring fastenings, and your mention of the experiments about to be tried by the Pennsylvania on train resistances.

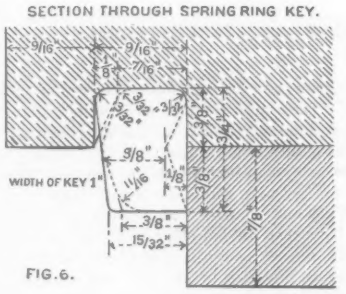
The spring ring shown is the present standard of the North German roads, including Saxony. They attach a good deal of importance to the arrangement of the wedge which fills up the gap in the ring. This wedge is formed differently in section from the ring itself, as you will see by the full lines in the enlarged view of it in Fig. 6, as compared with the dotted lines representing the ring itself. In order to insert it, the edge of the wheel felloe has to be cut out slightly, forming a shoulder each side of the wedge, and the groove in the tire has to be enlarged in a corresponding way. The object is to prevent the tire slipping round the felloe, which occasionally happens with the present powerful air-braking, in case the tire should become loose, through the slight contraction given to it in setting. This contraction is normally only 1 mm., to avoid undue tension in the tires.



STANDARD GERMAN CAR WHEEL AND AXLE.







STANDARD GERMAN CAR WHEEL TIRE FASTENING.

* See *Railroad Gazette*, page 294, April 18, 1884.

Economy in the Use of Oil and Tallow.

BLAIRSVILLE, Feb. 2, 1885.

TO THE EDITOR OF THE RAILROAD GAZETTE:

What we know and do about this matter is very simple. We simply know that one drop of a lubricant properly applied will do as much good as ten or a hundred improperly applied, and, knowing this, we base our actions upon it. We also know that the men who use these lubricants do not, as a general thing, use them with the care and attention that they should, and that they never will unless they are constantly reminded of the fact that notice is being taken of their wastefulness or economy, as the case may be. Now, in order to bring about a state of increased and constant economy on the part of the locomotive runners, the Road Foreman of Engines must, first of all, have a basis to work from, and this can only be obtained by using as limits for 100 miles of engine running as many quarts of oil and pounds of tallow as by actual practice they find sufficient in ordinary circumstances for the various runs on the division, and then insist that these limits be adhered to as closely as possible.

When we find that men are using more than these limits, we call them into the office and ask for an explanation, which, if considered good, permits them to depart with merely a few words of caution; but if it is not considered good, or they can offer none at all, they are told that at the end of another month there will be a reduction in their averages looked for, and that if such is not the case, there will be severe means used to obtain it in the future, such as taking them off a regular run and putting them on as extra, or if the case is an aggravated one, a suspension of a week or two. I am glad to be able to say, however, that not in one single instance have we had to resort to harsh and severe means to bring about this result. The men have nearly all readily fallen into line with us, and those who are disposed to carelessness are kept in check by the thought of what *might* happen them if they persist in the extravagant use of these stores. In order to show all our men that their records are being watched, and that we appreciate the efforts of those who are helping us in the introduction of economical measures, we write those of them who are running down to the limits a letter in which we compliment them on their good management, and urge them to continued care. In order to produce lasting results, this

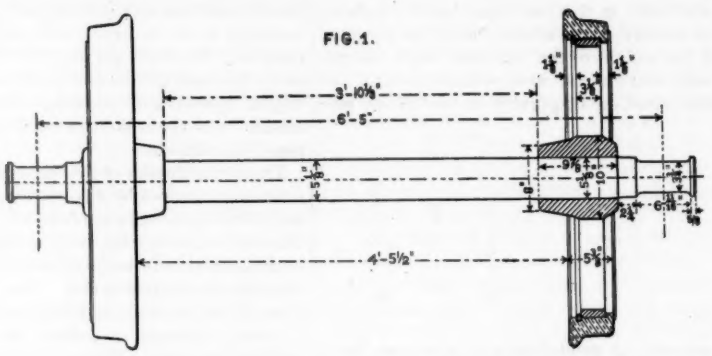


FIG. 2.

STANDARD GERMAN CAR WHEEL AND AXLE.

régime must be adhered to right straight along. "Unceasing vigilance" must be the motto, as any relaxation on the part of the superior will be followed by a dropping back into the old rut of wastefulness on the part of the runners.

The plan, if carried out, will produce the best results, and I think that the mention of the few following figures will back me up in saying that a little time and attention paid to this matter will be rewarded by a good showing on the right side of the balance sheet.

The division with which I am connected had in the year 1884 a credit of 847,757 miles of engine running. Its general average in use of lubricating oil, for 100 miles of running was 1.6433 quarts, and in use of tallow 1.635 lbs., or a cost per 100 miles of 16.4 cents for oil and for tallow 13 cents, making a total cost of 29.4 cents expended for lubricants for each 100 miles of engine running. The total cost for the entire mileage is about $2,502.

While I think that on the whole this is rather a good showing, I also think that in 1885 we shall be enabled to make a still better showing; feeling that as time goes by our men will more readily see that in paying attention to this matter they not only benefit the company, but that the reputation which they gain for themselves is something that is not to be ignored, and that therefore they will be stirred up with a feeling of emulation that will make itself felt in the yearly average.

W. P. DIV.

THE SCRAP HEAP.

Train Robbers.

A dispatch from Harwood, Tex., Feb. 15, says: "Two men got on the passenger train on the Galveston, Harrisburg & San Antonio road at Luling, about 10 o'clock to-night. When the train was about half way between Luling and Harwood, the passengers in the first-class coach were surprised on beholding their two supposed fellow passengers standing up in the centre of the car with handkerchiefs over the lower portion of their faces and revolvers in their hands. They quietly demanded the cash from the passengers in the coach, avoiding all jewelry. They made no attempt to go through the remainder of the train, but jumped from the platform while the cars were in motion. It was all done so quietly and quickly that the passengers in the other coaches and the conductor knew nothing of the robbery at the time. They secured about $300 in cash."

A Runaway Accident.

Three Wabash locomotives yesterday morning played quite an amusing game of catch, and one which, had it not been for the presence of mind displayed by one of the engineers, Mr. Scherer, might have been attended with disastrous consequences. Engine No. 1,168 came down from Decatur on Wednesday evening, drawing a special car, in which rode Superintendent Talmage and other Wabash officials. This engine remained over night in St. Louis, and yesterday morning started back for Decatur as a light engine. Arriving at the bridge junction, about a mile above the Relay depot, the engine halted, and the engineer got off and went up the tower and into the telegraph office for telegraph orders. While he was up there the outgoing morning passenger train from St. Louis, drawn by engine No. 1,569, hove in sight, and was approaching at a high rate of speed and upon the same track on which stood the empty engine. Though the engineer of the approaching passenger train shut off steam and applied the air brakes, it was evident that the train could not be stopped before it struck the empty locomotive. It was also impossible for the engineer of the empty to get from the telegraph to his engine before the clash, and so his fireman boarded the empty, pulled her throttle clear open, and then jumped off. The engine had not obtained much momentum before the passenger ran into her. The tender was stove in and the pilot of the passenger engine was knocked off. The passenger engine and train had now stopped, but the light or empty engine was beginning to operate well under the manipulation given her throttle by the fireman before he jumped off. It was only a minute or two before she was running at a terrific rate of speed, and was soon tearing along through the country at a rate of sixty miles an hour, or a mile a minute, with no one about to curb her in her race against time. It would be hard to say what would have become of her, or what havoc she might have played, had it not been for a Wabash switch engine, No. 1,110, which was doing some switching near Venice, and which was standing on the main track as the wild engine came in sight. The engineer of the switch engine, Mr. Scherer, saw the approaching engine coming, and at such a rate of speed that he concluded that her engineer was either drunk, crazy or dead, and tried to make a switch with his engine ere the wild engine arrived. But so fast did the coming engine seem to approach that Scherer saw that he could not make the switch in time and he wisely resolved to start ahead and see if he couldn't outrun the runaway. The race was an interesting one for a considerable distance, and the spectators in Venice and along the road could not imagine what the chase meant. Finally the wild engine came up with Engineer Scherer's locomotive, but the two were now going at nearly the same rate of speed, and the concussion was, in consequence, very light, and no damage was done. Then Scherer reversed his engine and let the runaway push him along. He next walked back over the tender of his engine, got upon the wild engine, reached her cab in safety, and shut off the steam on the wild engine and applied the air-brakes. In a short time he had both engines at a stand-still, after a wild and perilous run of several miles. Both engines were brought back to East St. Louis, and the assembled railroad men were greatly relieved when they learned that the wild engine had been corraled before any damage had been done, and all were loud in their plaudits to Engineer Scherer when it became known how the capture had been made, and he was the hero of the hour. Without doubt he is entitled to great praise for the presence of mind and the excellent judgment displayed.

The only one injured was Wm. Page, Scherer's fireman, who jumped from the engine when he learned that Scherer intended to capture the runaway locomotive. He was considerably bruised, but not seriously hurt. There are many races indulged in across this stretch of track, but that of yesterday was the wildest and most interesting and perilous that has ever taken place.—*St. Louis Republican, Feb.* 13.

Politeness.

They sat together in the smoking compartment of the sleeping car after breakfast, and were very quiet for a long time. At last the fat man remarked:

"It is curious how traveling affects some people. For instance, my feet are so swollen that I can only keep my boots on with positive agony."

"And how odd that I am affected just the opposite way," replied the other. "My feet shrink so that I could almost get both feet into one boot."

There was another long interval of silence, during which each cast cautious glances at the other.

"In such a case," said the third man, who sat opposite, "I should advise you to trade boots."

"Willingly," was the response in chorus.

As they were making the exchange the porter came up with the remark:

"I dun reckon I got dem ar' butes mixed up 'tween you two gem'len, an' each of you has got on the wrong pa'r."

"I knew it all the time," said the fat man.

"So did I!" added the other.

"But I'll be hanged if I let any Wisconsin man outdo me in politeness."

"And Wisconsin don't take no back seat for Missouri!"—*Detroit Free Press.*

A Switchwoman.

There is living in this city (Macon, Ga.) one of the most remarkable women in the world. Her name is Mary Carroll, and she is the only living female switchman. Her life is as singular as her experiences thrilling. She is 65 years old, and does more hard work than any man of her age. Her residence is about a mile from the passenger depot, where her every-day life is spent.

Situated opposite, at the railroad junction, is a small house at the main switch that guides the trains into the city from the Southwestern and the Macon & Western railroads. In this little house, seated before a roaring pine knot fire, in an old-fashioned split-bottom chair, she can be found smoking a pipe and knitting every day from half-past 5 in the morning to 5 in the afternoon. In the centre of the room is a large switch, with crank and windlass. Her duties are to change the rails for the different trains by this windlass. She is a specimen of physical womanhood seldom seen in a lifetime. Notwithstanding the severe strain of the windlass on her body and her ripe old age, she moves about with the sprightliness of a much younger person. She is a jolly old soul, and is known far and near. She saw the first bar of iron laid on the Monroe Railroad, Nov. 22, 1838, now the Macon & Western. She was personally acquainted with Master Machinist Robert Findlay, who was the engineer on the "Ocmulgee," the first engine that went over the road. She saw the first passenger car run to Section 7 of the road Dec. 3, and when the first train ran from Macon to Forsyth, Dec. 9 of the same year, was one of the passengers. She has seen every engine and known personally nearly every engineer and fireman of the roads that run into Macon. Every one has the highest respect for her, and always has a pleasant exchange of compliment.

Let us spend a while with her, and watch her as she attends to her duties.

Here comes the down train from Atlanta, thundering in. When it blows she puts aside her pipe and knitting, removes the pin from the windlass, grasps the handle, throws herself forward, and with one big grunt she places the switch in position, and says something to the engineer in a jocular manner. The train glides in, is placed on the right track, and moves into the city, the passengers little dreaming that they reach Macon at the hands of a woman. As the train passes she says: "These Atlanta trains are the funniest ones that pass here; they always seem to want folks to know where they come from." After awhile a lumbering big freight train will pass; she will call the engineer and ask him a question, and on he goes with a friendly wave of his hand.

Way down the Southwestern Railroad track is seen slowly winding to the switch as a huge serpent the morning passenger somewhat delayed. The down train from Atlanta is due, and is heard rumbling near Vineville station. Both are drawing nearer and nearer; who knows but what there will be a collision at the switch? The situation is one of peculiar interest. She is as cool as a cucumber, her eyes glitter with a strange light, her acute hearing and quick perception of danger causes her to be watchful. The switch is set for the train that has the right to the track, she clutches a red danger-signal flag, takes her stand on the track and waves it to and fro. It is seen, the engineers ply the air-brakes; all is safe; she sits down quietly and waits the next arrival. Her voice at the switch is given precedence; she rules as a queen.—*Macon Special in Atlanta Constitution.*

The Lehigh Coal & Navigation Co. Beneficial Fund.

The annual report of the Lehigh Coal & Navigation Co. for 1884, says: "During the year an arrangement, which has been long contemplated, was carried out in the formation of a beneficial fund for the workingmen in our mining region. The many accidents which seem inseparable from the production of anthracite create a great deal of suffering among a population many of whom have not been able to provide for such emergencies, and the existing forms of relief all have costly machinery, which greatly lessens the benefits to be realized by the contributors from their investments. Under the plan adopted last year, the company contributes to the beneficial fund one cent for each ton of coal mined, and the operatives contribute, some 1 per cent. and some 0½ per cent. of their earnings. In case of injury each one receives benefits at the rate of one-half of his weekly wages during his disability. When the injury results in death, $30 is paid for his funeral expenses, and a weekly stipend equal to one-half of the wages earned by the deceased is paid to his family for one year.

"The plan has met with almost universal acceptance, nearly everybody in the company's employment in the mining region being a contributor to the beneficial fund, and a vast amount of suffering has been mitigated during the past year by the continuance of maintenance at times when the ordinary sources of revenue have failed. Being very carefully administered, this plan has produced more money than has been required, but the demands upon such a fund continue to grow, and we shall have to wait a year or two to know thoroughly how the relief is apportioned to the necessities of the case."

Fast Railroading in '49.

I notice a paragraph copied into your issue of the 18th inst. from a New York paper, which says that the fastest time known to have been made by a locomotive was in 1849 on one of the Norris & Son engines, called the "Buffalo," a large freight engine, leaving Schenectady for Albany, N. Y., with two freight cars, D. Greeman, engineer, the distance run being 29¼ miles, which was run in 25 minutes.

The above is so full of inconsistencies and absurdities that I cannot resist the temptation to reply to it.

I was in the employ of the company in question at that time, and had been for three years previously (the Mohawk & Hudson, now a portion of the New York Central & Hudson River). In the first place, the company never had a Norris & Son engine. The distance between the points named is but 16 miles, and not 29¼ as stated, and there was not at that time nor afterward an engineer in their employ by the name of Greeman.

There never had been up to that time, neither has there up to the present time been, a freight engine built that could attain any such speed, which is at the rate of 70.8 miles per hour.

Neither could they have been kept upon the track could they have attained the speed, as the track in question, as also all others in this country so far as I remember at that time, what were known as the strap rail—that is, strap of iron generally ⅝ in. thick by 2½ wide, spiked to a longitudinal stick of timber about 6 in. square.

I have myself run a locomotive over such a track many thousands of miles, and, if my memory serves me, the present style of T-rail was not known in this country at that time; neither is there a passenger engine in this country at the present time that can keep up this speed with a train of cars for any considerable distance. I believe the fastest long-distance time made in this country was on the Pennsylvania Railroad, between Philadelphia and New York, a distance of 90 miles, which they claim to have made in 90 minutes, or at the rate of 60 miles an hour, with a Baldwin engine. I have ridden at the rate of 81 miles per hour for 15 or 20 miles between London and Dover, in England, on a regular train.—*Dyer Williams, in Cedar Rapids (Ia.) Republican.*

Train Wrecking.

A dispatch from Lawrence, Kan., Feb. 14, says: "There was an attempt made yesterday by three tramps to wreck the east bound Santa Fé passenger train. The party boarded the train at Topeka and refused to pay fare. As there were no stops between Topeka and Lawrence, the conductor did not attempt to put them off, but waited till the train arrived here, when he locked the doors of the cars and demanded their fare or threatened to have them arrested. Opening a window they escaped, and walking down the track broke the lock on a switch and turned it. The engine was ditched, but the rest of the train was saved by the slow speed at which the train was moving. As it was, a few bruises to the engineer and fireman was all the personal damage. The wreck was cleared so that trains were moving by noon. Two of the parties have been captured, and the third has been traced to Leavenworth."

A dispatch from San Antonio, Tex., Feb. 15, says: "When the east-bound Sunset passenger train reached Luling, 50 miles east of here, last night, it found two train wreckers. A short while before, the city marshal found two negroes placing crossties on the track. He summoned them to surrender, and, on their refusal, shot one, killing him, and wounding the other mortally. He was dying at last accounts received. An attempt was made to wreck a train a short distance below Luling some days ago."

The Use of a Red Shawl.

Near Springfield, N. Y., on the afternoon of Feb. 18, a passenger train on the Long Island Railroad had a narrow escape from being wrecked. A boy crossing the track at Locust avenue about 1:20 noticed that the roadbed had been washed out and that the track was giving way. He ran to a house near by and told John Hendrickson, a farmer, what he had seen. Hendrickson went to the spot, and, remembering that a train was due in a few minutes, he ran home, and, getting a red shawl from his wife, hurried down the track west of the curve, which is a few hundred feet beyond the wash-out, just in time to see the train coming at full speed. He waved the shawl, and the engineer reversed the engine, the train stopping within a short distance of the place of danger.

RAILROAD GAZETTE

Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

OSCILLATION FROM BROKEN JOINTS.

It was clear from the responses to our circular on tracks that the supposed tendency of broken joints to cause oscillation is the most serious and general ground for disbelieving in that mode of disposing them. Almost any one who gave any reason at all for objecting to it specified this as a chief objection.

Examination of the responses in detail, however, reveals a curious fact: With hardly a single exception those who raised this objection to broken joints are those who do not use them, and no one of those who are now using them or would prefer to do so (83 in all out of 128) mentions the supposed tendency as even a minor objection.

This fact is certainly suggestive. The inference is natural that a difficulty which was real would be most felt by those who are supposed to suffer from it, instead of by those who have *not* had, or at least are not now having, much opportunity for observation; especially as many thousand miles of very poor track are laid with broken joints. If 45 men should testify that they did not use Consolidation locomotives because they were not safe, and 83 men should testify that they did use them and found they were safe, the testimony of the 45 would not carry great weight.

Nevertheless, the inference drawn from the responses in favor of broken joints is only an inference, however strong, because so many different defects, of far greater aggregate importance, cause or tend to cause the car-body to rock on all kinds of track that it is a delicate matter to determine by direct observation whether breaking the joints does or does not increase the rocking.

Considering the question as one of theoretical mechanics, however, the inference drawn from statements of practical experience becomes at least greatly strengthened.

A car-body in oscillation is, mechanically, a pendulum, of the specific variety known as a *rocking pendulum*, a form little used in the arts, but familiar to most of us in the little rocking toys which persist in returning to the vertical.

The car-body rocks, not upon the centre-plate (at least it ought not to) nor on any other material rocker, but upon the springs; the truck bolster being to all intents and purposes a part of the car, so far as this motion is concerned. The motion of a rocking pendulum and of a common pendulum are governed by substantially the same laws. If we take the little drawing of a common pendulum in fig 1, and turn it upside down in fig. 2, we have, by imagining a rocker to be substituted for the bottom line, a representation of the car-body considered as a rocking pendulum; the point which was the bob of the pendulum in fig. 1 being now the so-called *centre of oscillation* of the car-body, in this case from 6 to 18 in. above the centre of gravity; those centres being the points at which, if all the weight of the car-body were concentrated at them, and the rest were without weight, the mass would be acted on by gravity or oscillation precisely as it now is. A pendulum bob, of course, has a similar centre, but one much nearer to its actual centre.

Fig. 1.

Fig. 2.

It will perhaps be clearer, and equally correct, to conceive of the car-body of fig. 2 as simply an inverted pendulum, to which the reaction of the springs supplies a force precisely equal (theoretically, not quite practically) in its magnitude and effect on motion to the natural action of gravity on the more familiar pendulum in fig. 1.

Within practical limits the period of oscillation of any pendulum of any kind depends solely upon the distance of this "centre of oscillation" from its point of support, and it varies as the *square root* of that distance. To vibrate twice as often it must be only one-fourth as long; to vibrate half as often it must be four times as long. The violence of the impact increases only the length of the arc through which it swings, but does not make it vibrate (sensibly) any faster or slower. Similarly, every car-body or other rocking pendulum has its natural period of vibration which cannot be changed.

The length of the car-body pendulum, as already defined, varies from 4 to 7 or more feet, as can be readily seen by examining drawings of cars, and its natural (and only) period of vibration will be as follows:*

Pendulum of 3 ft.	vibrates in	0.96	sec.	
" 4 "	"	1.11	"	Freight cars.
" 5 "	"	1.24	"	Freight cars.
" 6 "	"	1.36	"	Passenger cars.
" 7 "	"	1.47	"	Passenger cars.

The time of vibration, it will be seen, increases very slowly, varying only 50 per cent. for a variation in length of pendulum of 133 per cent.

With joints coming at every 15 ft., first on one side then on the other, and remembering that a train moving at 10 miles per hour passes over 15 (14⅔) ft. per second, the time in seconds between these impacts, and the length of a pendulum to vibrate *naturally* in that period of time, are as follows:

Miles per hour.	Time in seconds between impacts.	Length of pendulum vibrating in that time.
10	1	3.26 *ft.* or 39⅛ *in.*
15	⅔	1.44 " " 17⅛ "
20	½	0.81 " " 9¾ "
30	⅓	0.36 " " 4⅓ "
40	¼	0.20 " " 2⅜ "
60	1-6	0.09 " " 1⅛ "

It is obvious that to have the maximum effect the natural period of vibration of the car and the time between impacts of the joints should correspond, and comparing the two tables, it will be seen that with very low flat cars moving at 8 or 10 miles per hour there is a fair chance that they should so correspond; but as we come more closely within the limits of ordinary practice in speed and height of car-body, the disproportion increases very rapidly, until, with a sleeping car moving at 60 miles per hour, there is all the difference between 1⅛ *inches* and over 7 *feet* between the theoretical and actual pendulum.

To see more clearly the effect which the impacts as they really are will have, in such cases, let us dismiss the car-body pendulum and take what for our purpose is a substantially exact mechanical equivalent: a globe of lead weighing say a ton (it will be only 21 in. in diameter) suspended by a wire cord so as to form a pendulum 7 ft. long.

Every one knows how to make such a pendulum vibrate. A child's strength will do it in a few minutes if he will simply wait for the period of natural vibration to add each time a little more impetus. Impacts equivalent to (*i. e.*, one-twentieth as great as) those from average joints would speedily cause it to vibrate violently. But suppose, instead of striking it every 1½ seconds, its natural period, we begin striking it every half second or quarter second, first on one side, then on the other, what effect to cause oscillation shall we have? Not a particle; to use a common expression, "no more than if it were a lump of lead." The difference between striking the blows alternately or simultaneously will not be perceptible to the senses, unless made disproportionately violent.

This, however, assumes the impacts to be approximately uniform and to be the only ones acting, which certainly is not an exact, and might make an unfair, parallel. There are all sorts of irregular jolts and impacts happening from many causes, the effect of which might, conceivably at least, be intensified by that arising from the broken joints when the impacts happened to coincide.

That coincidences of this kind do sometimes happen is probably proved by an occurrence which most habitual travelers must have noticed on all kinds of track. The car will be moving with normal smoothness when on a sudden it will begin to vibrate with some violence, without discernable cause. The vibration will continue a few seconds, and stop as abruptly as it began.

Let us endeavor to parallel these irregular effects and the probable influence of broken or even joints upon them. The quickest way to set a pendulum in motion, as every one knows who has ever slung a sling, is to alter the position of its point of support. The amount of motion to be given to it to, have equal effect with moderate blows on the "bob," may be calculated. It is not great. Let us hang, then, our heavy pendulum to a compound support, the first part of which admits of a regular and rapid motion, 2, 3 or 6 times per second. That imitates the normal action of the broken joints as compared with even, and does not exist with the latter. In itself it will have no cumulative effect, as we have seen. Now let this first support, with its means for giving the regular motion, be itself carried upon another support capable at will of *irregular* motion. These motions, we may admit, should be somewhat more vigorous—let us for safety say considerably more vigorous—than with even joints. Let us suppose this duplex apparatus to be set in motion, with a view to creating oscillation in the pendulum.

So far as respects any vibratory, cumulative tendency (the distinction between that and single impulses must be always observed), it will be seen that we are precisely where we were before. The addition of several more discordant elements does not give any—not the slightest—additional tendency to the regular rhythmical movement which is the essence of oscillation, *unless* a succession of the irregular movements happen to coincide with the natural period of vibration of the pendulum, when the extra impacts due to the broken joints might increase the tendency, but on the other hand might also diminish it. Otherwise, the effect of the additional movements is much like sounding several more musical notes at random with the idea of bettering the chance of hitting on a harmony. We may do it, but until we do it completely we do not come any nearer to it by sounding more notes. The assumed pendulum will be given a disagreeable and irregular tremor, for every time the point of support moves laterally, the weight must be lifted. A similar continuous effect is familiar enough on cars, but that is an entirely different thing from regular and normal oscillation.

There is therefore, it would seem, no tendency to create oscillation, properly so called, in the *order* in which the impacts from joints come on broken-joint track. Their effect is simply that due to each one individually, and this effect we have previously seen to be greatly ameliorated by laying the rails to break joints.

Summarizing the conclusions of this discussion, they seem to indicate the following as the effect of laying track with broken joints, on any line sufficiently well maintained to run regular passenger trains at 35 to 40 miles per hour:

1. There is no regular and normal tendency whatever to create or continue oscillation. Irregular effects of the kind occur on all kinds of track, but are not necessarily intensified by breaking the joints and are not an important consideration.

2. The effect of the rattle and noise from the joints is very materially diminished, to the extent that the impacts which are always separately audible on the finest even-joint track at the highest speeds are practically lost in a confused roar due both to the double rapidity and to the less intensity of the impacts, the effect being to create an impression that the track is, relatively, better than it is.

3. That portion of the dancing and trembling of the car which is due to the joints is very materially reduced, so that the difference is quite as great in this respect as between a four-wheel and an eight-wheel truck.

4. The natural tendency of the deterioration at joints, the joint sinking and the opposite rail becoming slightly high, is well calculated to reduce this jolting motion still further and measurably to eliminate it altogether, so that the effect of given depressions of joints is less injurious than when two joints come opposite each other. For this reason less violent shocks will be given to the track and running gear, and the

*Time in seconds $= \sqrt{\frac{\text{length in in.}}{39.102}}$

interval of time between resurfacings may be greater, for equal deleterious effects.

5. The lateral stiffness of the track, resisting injury to the line, is much increased. This fact is so obvious and generally admitted that it has not heretofore been dwelt upon.

6. Other defects of track and rolling stock, bad level, bad line, bad gauge, bad wheels, etc., are far more important in their aggregate effect on the riding of cars than any difference in the disposition of the joints, so that although the defects of the joints alone would appear to be reduced by a very heavy percentage, yet the percentage of improvement in the track as a whole cannot be expected to be a very large one, from this betterment alone.

These conclusions are given not as proven, but as "indicated." If they contain errors they are open to correction. To them may be added another: When track is so very bad that speed must be always slow, and each individual joint is so low and so slowly passed over that it is liable to give not simply a shock but a lurch, there are many reasons in this discussion to justify the general feeling that even joints are then much the safest and best; but to the question with which we opened: "Should the use of broken joints begin as soon as the track ceases to be very bad, or only when it becomes very good?" the answer seems clearly: At or about the point when it ceases to be very bad.

The Principles of Rate-Making in Germany.

An Austrian railroad officer has recently published a small volume on railroad rates,* which consists of a series of lectures delivered at the Vienna Railroad School. It is of no direct practical use to American railroad men. Indirectly, it is a work of great interest and importance. Its uselessness and its interest are both due to the same cause—the set of assumptions from which it starts.

These assumptions are: first, that railroads are not run, primarily, as money-making concerns, but with a view to the public service; and second, that their rates should, as far as possible, be based upon cost of service. These are obviously not principles upon which American railroads are managed; hence the uselessness of the book to American railroad men. But they are principles on which a large section of the public thinks that our railroad system ought to be managed. They are principles which underlie a great deal of the legislation on the subject, and which are accepted as axioms by a majority, perhaps, of our lawyers and judges. Now, if the public and the lawyers would read this book—which they unfortunately will not—they would find that there were more things in the public-use and cost-of-service principles than ever were dreamed of in their philosophy. They would see before them the story of an attempt to carry out these principles under the most favorable circumstances. They would find that to carry them out completely was impossible; that to carry them out even partially involved the use of means which the American public dislikes, and produced results which the American public would dislike still more.

The conditions in Austria and Germany are more favorable to the attempt to base rates upon cost of service than they are, or ever could be, anywhere in the United States, for

1. The stockholders had invested their money in railroads with the understanding that they were to be regulated on this principle.

2. Charters were only granted to such roads as it was thought existing business needed; so that the railroads were not made dependent upon a system of special rates to develop business.

3. The railroad officials as a body were trained to believe in the cost of service principle; and they regarded themselves as public servants responsible to the government quite as much as to the owners of the railroad.

4. The public was accustomed to see government interfere in everything, and arrange it according to schedules; and it would have been regarded as a strange exception if nothing of the kind had been done in the case of railroads.

5. Finally, there was a well organized civil service that could be trusted to make a systematic, and at the same time intelligent effort to carry out any measures upon which the government should decide.

If in a country like Austria, where every one of these conditions is present, the system meets with imperfect success, what can our legislators expect in a country like America, where every one of these conditions is absent?

This lesson constitutes what is really interesting and important in the book. It shows on almost every page the difficulty of basing rates upon cost of service, and the theories kindred with it. Its testimony is all the more convincing, because the author does not write to oppose these theories. He is, at bottom, in sympathy with them; but being a practical railroad man of intelligence, he sees the difficulties in their application.

What, then, are the results of the combined efforts of managers, agents, shippers, courts and statesmen to dedicate property to public use and have rates based upon cost of service?

1. In the first place, they apparently know less about cost of service than we do in America. To any one who candidly contemplates the depth of his own ignorance on the subject, this will seem like a rash statement; but we hazard it, nevertheless. What does the American reader say to a chapter on "Cost of Transportation" in which the subject of back loading is not mentioned? What does he say to an author who draws the distinction between fixed charges and running expenses so loosely as to leave us in doubt under which head we are to include maintenance of way? What does the American reader say to this? "Of course, in making rates, the interest on invested capital can often only partly be taken into account, and often not at all. In such cases the element of interest must be partly or wholly left out of account, *and an effort must be made to get out of it by a subsidy, or in some other way. But when, for want of sufficient volume of traffic, gross earnings fall short of operating expenses, the mere operating expenses themselves cannot be taken into account.*"

The American reader will probably say that Herr Schreiber had an eye on the receivership of the West Shore. But, seriously, the above-quoted passage shows an utter failure to appreciate the fundamental differences between the fixed and variable elements in cost. Nor does he, in comparing the train-mile and ton-mile units, seize upon the fundamental distinction that the train-mile is, in its rough way, the unit of *railroad* service, and the ton-mile the unit of *public* service in the same rough way.

The one distinction which he makes with real care is that between terminal and movement expenses; pro-rating the general expenses and the fixed charges upon these heads, and coming to the conclusion that the total movement expense for passengers is twice the terminal expense, and for freight three times the terminal expense. The trouble with calculations of this kind is that while they may represent fairly enough the condition of traffic at any given moment, they furnish little or no guidance as to the effect of any changes in rates or in methods of business. The fact is, the Germans are so occupied with the important question, What is a fair rate under existing conditions of traffic, that they neglect the still more important question, How can the conditions of traffic be so changed that we can make money by reducing rates.

2. They cannot apply the cost-of-service principle everywhere. In the matter of classification they do not even pretend to do so. The most serious and persistent attempt to avoid classification based upon value was made by the German government in its newly-acquired provinces of Alsace and Lorraine. Statistics have been trumpeted abroad to show what a wonderful proportion of paying to dead weight was obtained by this method. But these statistics suppress an equally important fact which tells on the opposite side. The amount of time in which the cars lie idle was enormously increased.

The railroads of Baden, after trying this system for a short time, came back to the so-called "reform tariff" of Germany, which has, for goods shipped by the car-load, four classes (B, I., II., III.), based upon value and not upon cost. And almost every other country does more than this. In Belgium they carry the matter of classification, in some respects at any rate, further than we do in America.

In grading charges according to distance, they try to apply the cost-of-service principle; starting with a fixed terminal charge, to which is added an equal mileage rate. But they do not carry this out consistently. For long distances they lower the mileage rate. For very short distances they sometimes do not charge the full terminal. The very short distance business will not bear the rates based upon cost of service, because of wagon competition. The very long distance business cannot bear them, because of the competition of other localities in the same market. The charges at critical points are thus really adapted to what the traffic will bear.

3. Where there is active competition they see that it is impossible to carry out the cost-of-service principle at all. They therefore try to avoid railroad competition: not chartering parallel roads; encouraging pools among those that already exist; and even dividing traffic between railroads and water routes according to fixed percentages.

There is no lack of discussion concerning the possibility of railroad competition. This discussion is even wilder in Germany than it is with us. Some even go so far as to favor the idea (held and exploded in England long ago) that tolls should be charged for the use of the road, and any one should be at liberty to run cars or even trains of his own upon it. But there is no serious attempt to carry these theories into practice. Both the railroads and the government are fully persuaded that "to limit competition sooner or later becomes a matter of absolute necessity for the industrial interest of the nation." Only by such a limitation—that is, by a division of traffic, are they able to carry out any system of rates at all, or to avoid the worst forms of personal discrimination.

Both traffic pools and money pools are frequent. Schreiber expresses a decided preference in favor of the latter. We learn with interest that cases are frequent where competitive traffic is all sent by one route, which pays the other routes an indemnity for their refusal to compete.

The results of German policy with regard to traffic and rates may be summed up as follows:

They avoid a large part of the merely personal discriminations. They try to avoid local discriminations, and succeed to a large extent; but only through the agency of a complicated system of pooling contracts, recognized and enforced by the state: the state, in its capacity as railroad owner, being itself a party to many of these agreements. When for any reason they do not have pools, they have discrimination.

Although they try to base rates upon cost of service, they cannot carry the principle out in the matter of classification.

By constantly fixing their eyes upon cost of service, they have kept rates high, have failed to develop business, and have been discouraged from building railroads when they were needed, unless they had a subsidy from the state.

How high their rates are, a glance at the facts is sufficient to prove. If we compare the statistics of the railroads of Ohio for the last five years, we find that the average rates on *all* traffic, per ton-mile, were less than the Prussian railroad rates for *coal* for the same average distance. And some such result must inevitably follow the attempt to base rates upon cost of service. If a railroad cannot lower any charges without lowering all, it will not lower any. It is obvious that this must have a bad effect upon the development of business.

Its indirect effect is thus bad for the railroads: If railroads are not allowed to arrange their tariffs on business principles, there will be less inducement to build them. In order to have the necessary roads, the government will be called upon for a subsidy. Instead of a tax upon those shippers to whom the road is most necessary (which is the effect of a system of discriminating rates), we shall then have a tax upon the whole country. If we must have railroads they must be paid for by somebody—either by their own business or by the country at large.

Prospects for Through Trunk-Line Rates.

The through trunk-line business has but once or twice before been so completely demoralized as it is now. Except for the temporary obstructi n of the rai roads, the east-bound rates would little more than cover average expenses, and the blockades that keep up the rates probably increase the expenses more than the rates. The pressure of traffic might possibly have kept up the rate to 20 cents throughout this month if the roads had been unobstructed, but the opening of navigation is so near at hand now that very large shipments are not likely to be made except at very low rates, and there is apparently nothing to prevent rates falling as they did last spring, when the roads carried an enormous traffic at a 15-cent rate, unless they decline to compete at that rate, which they have never done heretofore. The winter traffic might have been made to yield a good profit, but the chance has been for the most part thrown away, and the large shipments have yielded but little profit. Profit could be had hereafter, because very considerable shipments will go by rail for domestic supply at any reasonable rate, though the exports might nearly all be held for the opening of navigation; but with no means of maintaining a reasonably profitable rate, the railroads are more likely to carry 150,000 tons a week, at $3 a ton, leaving no profit whatever, than to carry 80,000 tons a week at $5 a ton, yielding a profit of $160,000 a week, which latter, or something better, would be entirely practicable. And after a winter and a March of a 20 cent rate or less, the railroads may hesitate to make an advance after navigation

* *Das Tarifwesen des Eisenbahnen.* [The System of Railroad Rates.] By J. F. Schreiber, Eisenbahn Central Inspector. Vienna: A. Hartleben. Pp. viii., 252.

opens; though last year an advance from 15 to 20 cents was made June 24, and from 20 to 25, July 22.

With regard to west-bound freight, the present low rates, about one-third less than the standard tariff, cannot be advanced before July, because contracts have been made for shipments until that date. The cause of the reduction in the first place was the discovery that one of the roads had made contracts at that rate. At first it seems not to have been known that the contracts were for so long a period; but it has become known, and all the roads are now authorized to make contracts for that time, which will result in a loss of about $2,200,000 of *net earnings* for the five months down to July, to all the railroads concerned, on the shipments from the seaboard cities, besides a large decrease in the earnings on shipments from interior Eastern points—altogether a needless throwing away of profits. It is noticeable that the reduction last January has not increased shipments, while a similar reduction made in August, 1881, was followed by a very large increase in the shipments, which were frequently 40 to 60 per cent. more than in corresponding months of the previous year. The shipments now are rather less than last year at this time.

Through passenger rates in both directions are little more than half the regular rates, and immigrant rates remain at a dollar from New York to Chicago, the Pennsylvania Railroad doing all the business, which is small, and doubtless will remain so in spite of the rates, which are reduced by the steamers also, so that for the wages of a week or two's work in this country the laborer at a European port can have himself carried to Cincinnati, Chicago or St. Louis. Owing to the sales of orders for tickets by European steamship agencies, it is feared that this dollar rate will have to last through the season. At all events there is not now any prospect of a profit from the carriage of immigrants. The other through passenger rates probably could be restored at any time. And at almost any time there may be some change in the control of a railroad which will at once make the way clear for a united, serious and finally successful effort to restore all through rates, and the change may occur between two days. But, as we have tried to show above, there are certain obstacles in the way of immediate success, which unanimity even cannot overcome. The west-bound freight has been contracted away till July, the circumstances make it very difficult to maintain a 25-cent rate on east-bound freight, and the emigrant rates are likely to be kept down by the sales of orders for tickets abroad.

The illustrations of the German car-wheel, axle and tire fastening, which we publish on another page, are interesting as showing the similiarity of the dimensions of essential and heavily-strained parts of railroad cars in widely-separated countries. Experience has, in both cases, doubtless dictated the leading proportion of both wheels and axles, but the variations are very few. The chief peculiarity about the axle is, that it is made parallel for the greater part of its length. This is not theoretically the strongest form or the most economical of metal, but it is somewhat easier to make, and it is practically impossible to turn it with a sharp shoulder at the back of the hub, a practice that has broken thousands of otherwise good axles. The journal is slightly shorter than the Master Car-Builders' standard, but as considerable pains are taken in Germany to make the journal boxes absolutely oil tight and dust-proof, and a system of siphons and lubricating pads insures at all times a supply of good oil to the journal, it is probable that the journal is, under the circumstances, less liable to heat than that of the Master Car-Builders' measuring, 7 in. × 5½ in. When our standard axle was adopted, the load carried on it was much less than that on the German axle, as two of the latter carried a car weighing about seven or eight tons and a load weighing 11 tons, while our cars then weighed usually but 10 tons and carried 10 or 12 tons. Now that we have made our cars weigh 12 tons or so and carry 20 tons, we have still but about 8 tons per axle, against 9 or more on the German axle.

The journal in general use in England measures 8 in. by 3¾ in., and despite high speeds and cheap oils, rarely heats, the principal trouble being from end wear.

The thick, low, blunt flange of the German tire is somewhat different from the form usual here, though the radius of the throat, $\frac{9}{16}$ in, is not widely different.

The Passenger Brakeman.

The title of this article will very likely cause the reader to glance at the head of the page to make sure that he is not reading a copy of the Burlington *Hawkeye* or the Detroit *Free Press*, the sub-official referred to being so often taken as a text for the nonsense these papers are so noted for. We are not going to dispute their right to the subject, however; the average passenger journey "out West" is so long that people of any mental activity whatever *must* have something to think about, and as the least laborious thinking is the sort generally in demand under such circumstances, what could be more natural than to cogitate upon the movements of the one active personality among so many passive ones? Moreover, we will not only leave the humorous side of our subject to the idle reporter, but we will, for the present, leave out the opposite extreme, the ultra-business side of the brakeman's calling, and consider in this place merely some of what may be called its esthetic points. For, though the duties we now speak of are really important to the employer, and all the time growing more so, we do not forget that they are secondary to the first essential—proficiency and reliability in caring for the safety of the train. Notwithstanding the increasing attention paid by railroads to the comfort of passengers, it remains as a fact that there is still a good deal of discomfort of one sort or another endured, and it may perhaps be of advantage to search for the causes of this state of things.

The winter season is the time which affords the largest opportunities for a passenger-train man to show what sort of aptitude he has for the business of promoting passengers' comfort, and we will indicate some of the main points of our inquiry by recounting some of the weak points that were observed the other day in a brakeman who was *wholly bad*, and given over to evil devices. Of course our readers, if brakemen, are all good ones; but to give force we must show up a pronounced example.

In the very outset the observer was unfavorably impressed by this bad brakeman, for while he ought to have been assisting passengers, he was talking with a young woman on the station platform. The passengers boarding the train rushed up the steps as though their lives depended on getting the very best seats; and those inside the car, about to alight, being much less anxious about finding desirable standing room out-doors, moved very leisurely; and so there was a regular blockade on the car platform, which wasted some time and disgusted all the cool-headed people who saw it. One of the passengers was a lady, but she did not notice that it was the smoking car, and so was as urgent as the rest. The brakeman doubtless thought she ought to know enough to look and see where she was going, forgetting that many otherwise very sensible people lose control of at least a portion of their wits when they go on a journey. As the train started, several of the more modest passengers were still standing, having failed to find any seat which was not at least half occupied by one of the ordinary kind of hogs usually found in such places. Of course, all finally found seats, but the point noticed was, that the process took considerable time and caused a good deal of petty annoyance. Where four seats are occupied by four men, and four ladies come into the car, a polite brakeman ought to be on hand gently to dislodge two of the men, put them in with the other two, and thus permit the ladies to sit together. As we said, passengers *can* arrange these matters themselves, but it makes them feel much better to have it done by a disinterested party. A defender of the brakeman remarked that when passengers were requested to accommodate each other they were quite likely to show their teeth, even when approached politely; and that some of the sourest would sometimes complain to the superintendent, thus scaring the brakeman out of doing his duty; for repeated interviews with the superintendent were dreaded, even if their results were not always disastrous. We know of only one remedy for this difficulty; and that is for brakemen to realize that politeness is an *important* part of their qualifications, and to study it as a fine art. In dealing with the selfish people who travel on railroads, one must not only be polite, but he must be very polite; or more exactly, very skillful in his practice of this virtue. And when we say very polite, we do not mean that fawning obsequiousness which is at once detected by the sensible observer as the trick of a lazy and unprincipled person, but rather an honest and lively interest in making a passenger not only at ease, but aware that he is so, and aware that efforts are made in that direction, so that he will recommend the road to his friends.

Aid to passengers, which they will not ask for, but which they appreciate all the same, can be rendered outside the cars as well as in, and the brakeman can find here a good field of usefulness. Most roads have, unfortunately, not yet provided many of their stations with proper awnings or roofs, so that in stormy weather passengers, frequently without umbrellas, have to alight (in the ordinary course) in the wet. In many cases the brakeman can let them out dry-shod by sending them through one or more coaches. Brakemen should post themselves as to connecting roads, hack transfers and kindred matters, so as not to have to send inquiries to the conductor or station-agent with every little question.

But space forbids our enlarging further. The reader who regards these matters as too trifling should remember that the more obvious points already receive their share of attention, and that no road can attain for itself a prominent position, not to say one of distinction, without giving close attention to *both* the salient and the minor features of the art of pleasing patrons. And, if any division superintendent happens to read this and thinks he has any brakemen who could advantageously act upon the hints here thrown out, we would suggest that the best way to bring about the desired result would be for him to attend personally to the duty of seeing that the men are fully and minutely informed as to what is required of them. Many train-men to whom suavity is not natural have but dim notions in regard to what the management expects of them in this direction.

It might be said that brakemen should learn a lesson from the train porters, sleeping car porters and others whose business it is to please the public. It will be acknowledged, though, we believe, that most of this latter class act on an entirely wrong principle. Either from inclination or from force of circumstances, they give too much thought to the possible gratuities they may secure, and, unconsciously perhaps, get into the habit of looking much more sharply after the comfort of wealthy (and presumably generous) patrons than of that of the ordinary run. Besides, passenger brakemen are, generally speaking, more intelligent than the other class, and therefore capable of a higher degree of accomplishment in the art of pleasing passengers.

British Rail Exports.

The British Board of Trade reports no exports of rails to the United States in the month of December, which is the first month since 1878 or early in 1879 that there have been no exports to this country. The rise and fall in the American demand for British rails have both been remarkable. The exports to this country for 11 years have been:

Year.	Tons.	Year.	Tons.
1876	256	1881	290,140
1877	31	1882	195,007
1878	9	1883	71,378
1879	44,570	1884	17,483
1880	219,275		

Previous to 1876 there had been large imports, amounting, from all countries, to 505,375 tons in 1871, when they were largest, and all but a very small part of these were doubtless from Great Britain. But from 1876 to 1878 there were substantially no exports to this country, and they did not fairly begin until August in 1879, the average monthly exports for the first seven months of the year having been but 1,262 tons, while in the last five months they were 7,124 tons. In 1880 they were nearly five times as great and in 1881 nearly seven times as great as in 1879, and then they fell off nearly as rapidly as they increased, until last year they were not *one-sixteenth* of the exports of 1881, and the smallest since 1878.

These fluctuations seem great, but they should be considered in connection with the total consumption in this country. They were even in 1881 but a small part of this—about one-seventh. Since 1873 we have taken from abroad only a small part of the rails we have used, and the proportion has reached 10 per cent. since 1874 only in 1880, 1881 and 1882—years of an extraordinary amount of railroad building. In 1883 not more than 3 per cent., and last year probably not more than 1½ per cent. of the rails consumed were imported, and the capacity of the home works has been much above the actual consumption.

The importation of iron rails (as also, doubtless, their manufacture) has practically ceased. In 1879 and 1880 nearly half our imports, and in 1881 more than a third of them, were iron. For six years the British exports of iron rails to this country have been:

1879.	1880.	1881.	1882.	1883.	1884.
20,820	106,061	96,139	21,134	2,035	7

In 1881 we took four-fifths of the total British exports of iron rails; in 1882, 45 per cent.; in 1883 8½ per cent.; last year one-twentieth of 1 per cent. of them, the total amount decreasing all the time.

The British rail exports to countries other than the United States were larger in 1883 than for many years previously, though the exports to this country then were not one-fourth as great as in 1881, when we took more than 40 per cent. of the total British exports. For five years the exports to the United States, to other countries and to all countries, have been:

	1880.	1881.	1882.	1883.	1884.
To United States	219,275	290,140	195,007	71,378	17,483
To other countries	318 815	425,992	586,776	707,036	524,267
Total	538,090	716,132	781,783	778,414	541,750
P. c. to U. S.	40.7	40.5	25.0	9.2	3.2

Thus the exports in 1884 to countries other than this, though 26 per cent. less than in 1883 and nearly 10 per cent. less than in 1882, were 24 per cent. *more* than in 1881 and 65 per cent. more than in 1880, which were years of larger exports than for some time previously.

The exports to each of the countries taking the largest quantities for the last four years have been:

	1881.	1882.	1883.	1884.
Australasia	88,606	81,021	137,083	111,366
East India	46,609	88,342	129,932	91,090
Argentine Republic	*.....	44,183	79,680	77,757
British North America	104,717	89,985	75,027	57,206
Brazil	34,152	45,897	33,839	34,693
Sweden and Norway	12,358	9,685	24,665	25,441
United States	290,140	195,007	71,378	17,483
Italy	25,064	71,132	59,065	9,224
South Africa	*.....	32,382	34,522	9,613
Mexico	*.....	40,361	32,147	2,654
Unspecified countries	96,649	52,497	74,307	51,734

* Included in "unspecified countries" in 1881.

All these countries except the United States, Sweden and Norway and Italy, get nearly all their rails from Great Britain, so that the exports indicate very nearly their total consumption. All of them together have not in any year consumed half as much as the United States, except possibly in 1883. It will be noticed that, since we ceased to import largely, a very large part of the British exports have gone to British colonies or dependencies, as follows:

	1881.	1882.	1883.	1884.
Tons to colonies	†239,952	291,730	376,574	269,285
P. c. of total	33.4	37.3	48.3	49.4

† Besides South Africa.

MEADOWS FREIGHT YARD,

NEW YORK DIVISION,

PENNSYLVANIA RAILROAD.

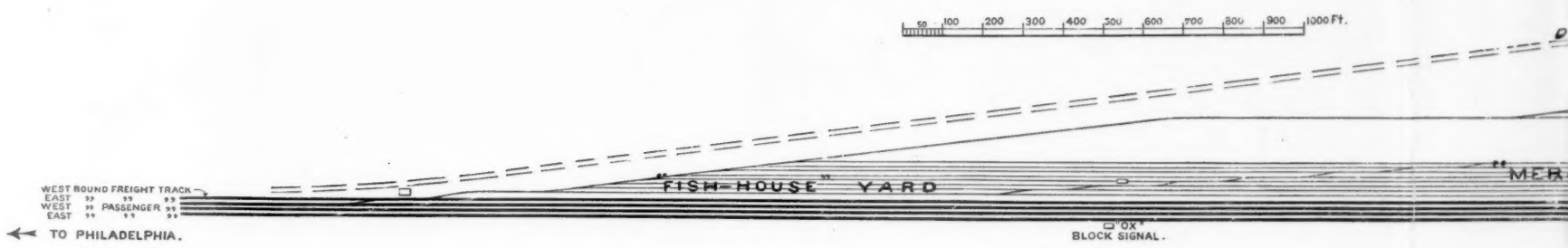


FIG. No. 2.

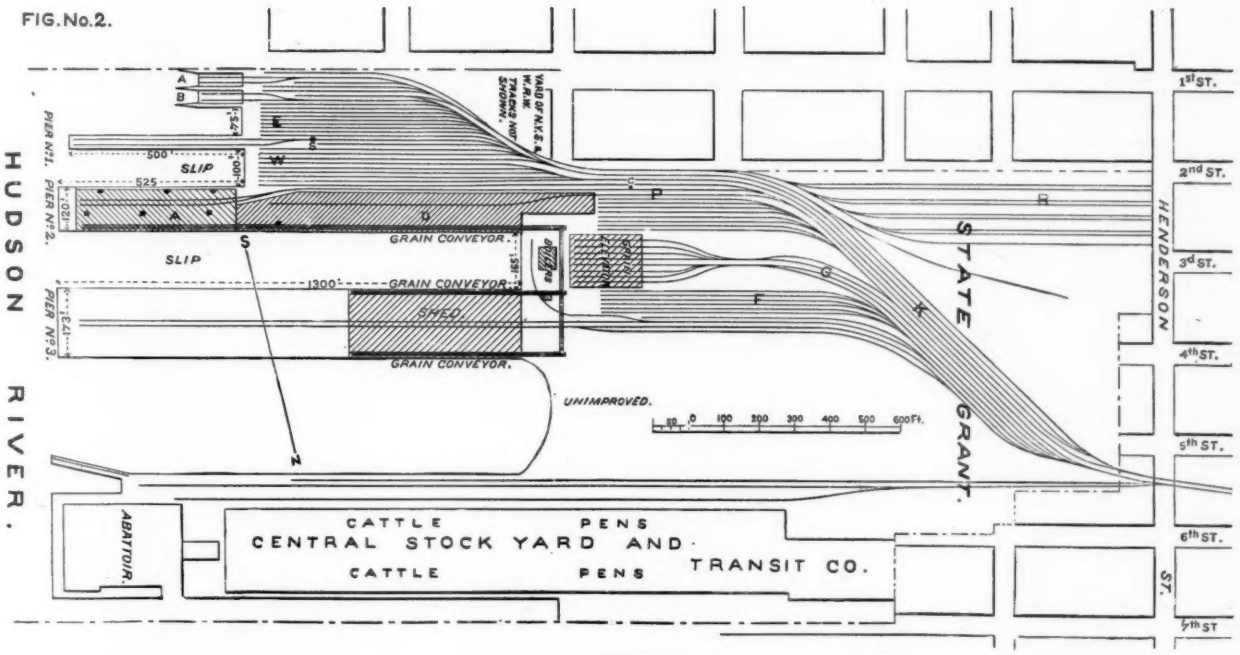
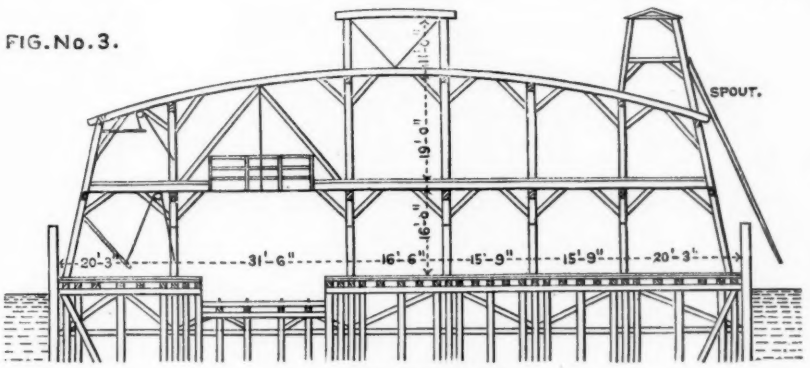
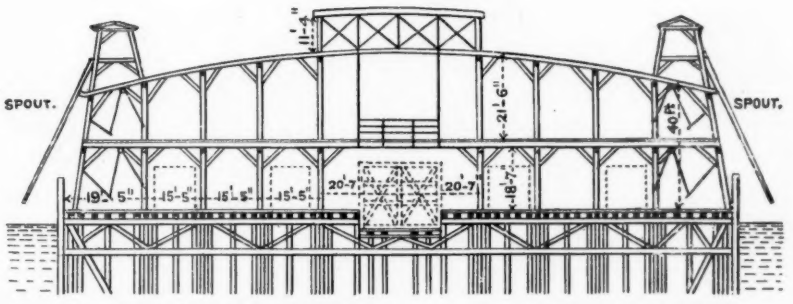


FIG. No. 3.



SHED 120 X 458.7 F.T.
SECTION OF FREIGHT SHED, PIER 2.
HARSIMUS COVE.
RIVER VIEW.



8 Ft. CENT. TO CENT. OF PILE BENTS. FRAME IN 16 Ft. SECTIONS.
SHED 173.5 X 481.4 FT.
SECTION OF FREIGHT SHED PIER 3.
HARSIMUS COVE.

FIG. No. 4.

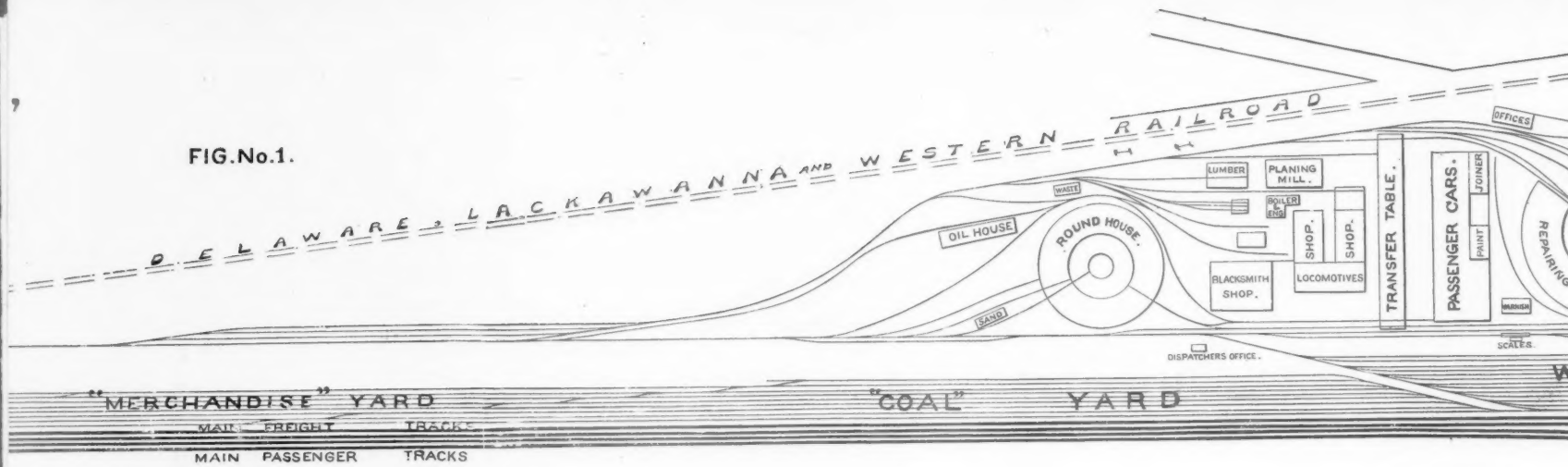
HARSIMUS COVE FREIGHT STATION
JERSEY CITY N. J.

WATER END

340
289
288
243
242
B 197
190
144
99
98
53
52
1

RAILROA

FIG.No.1.



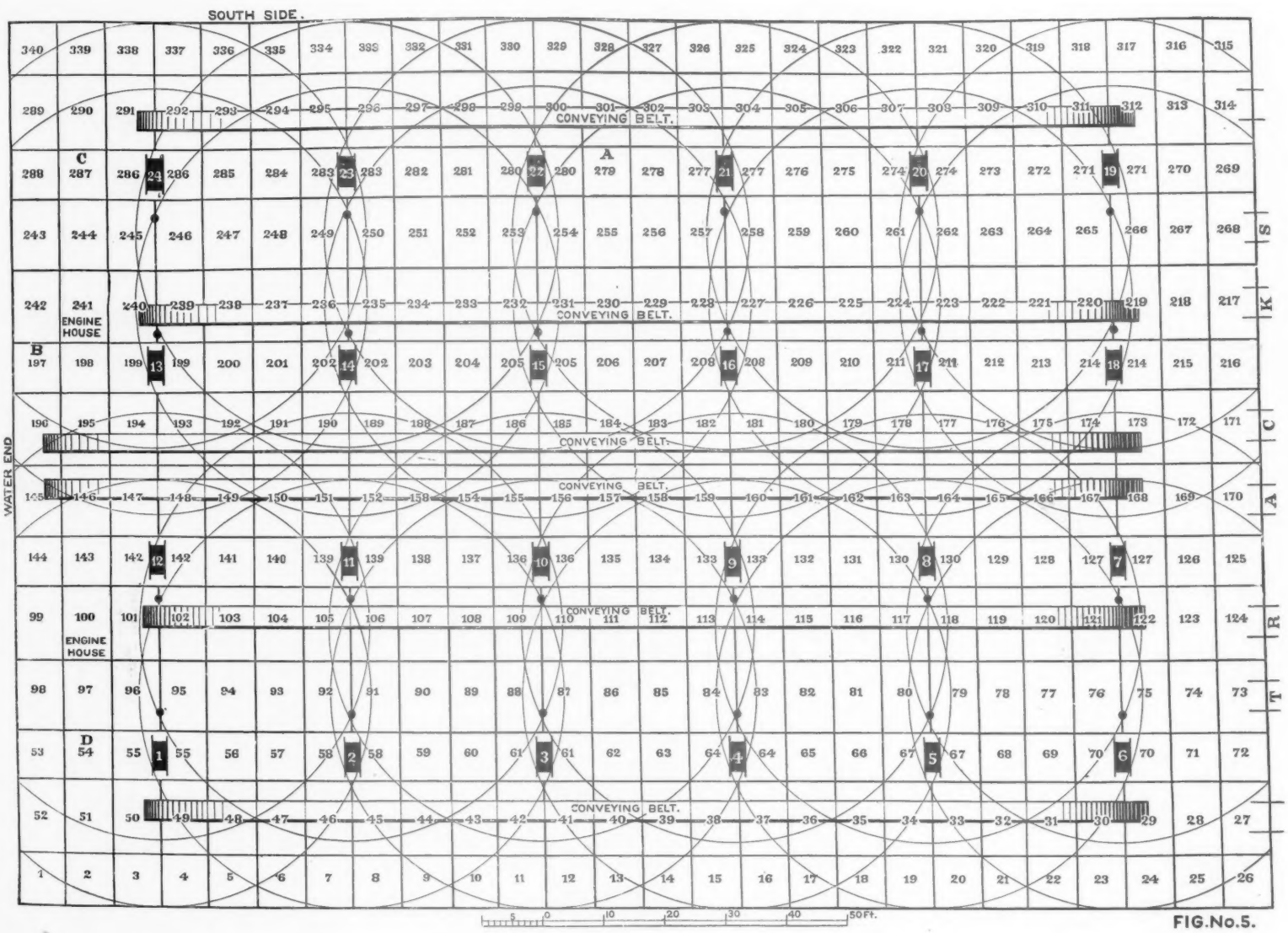
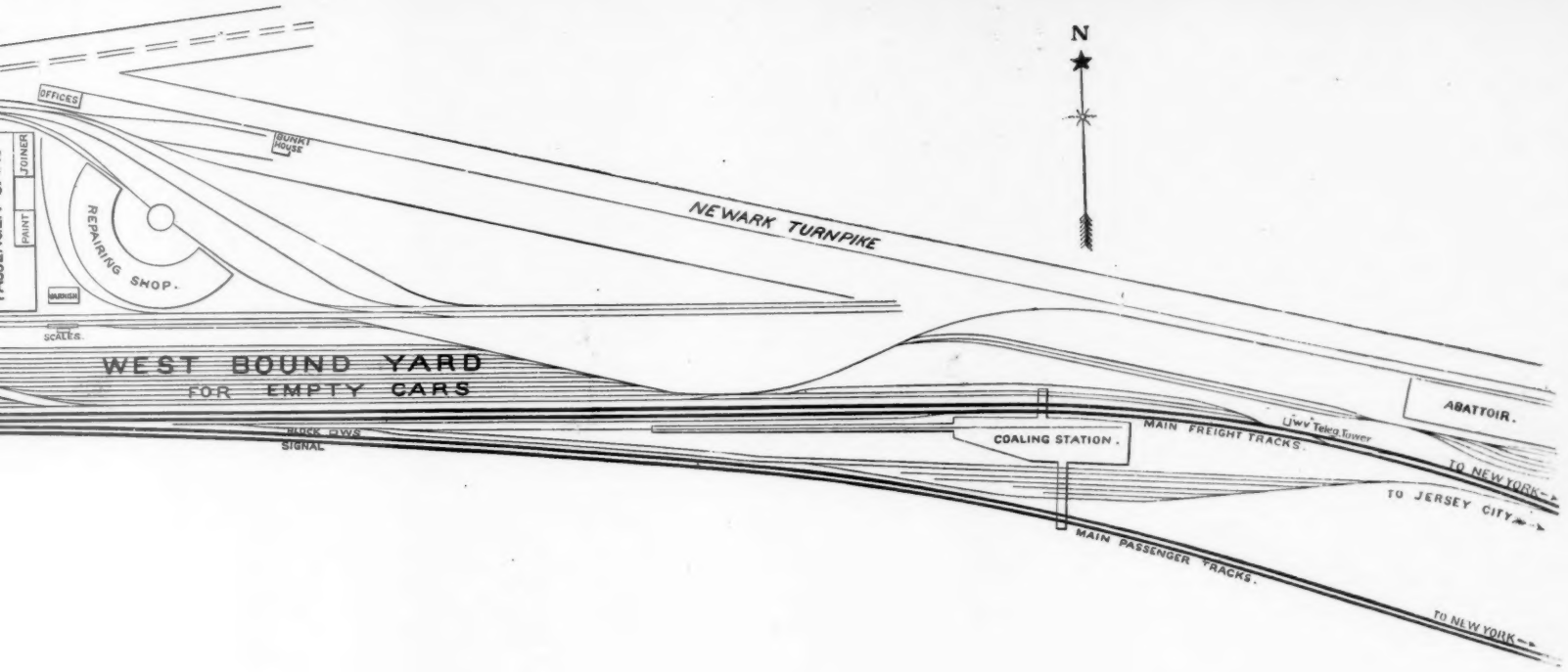


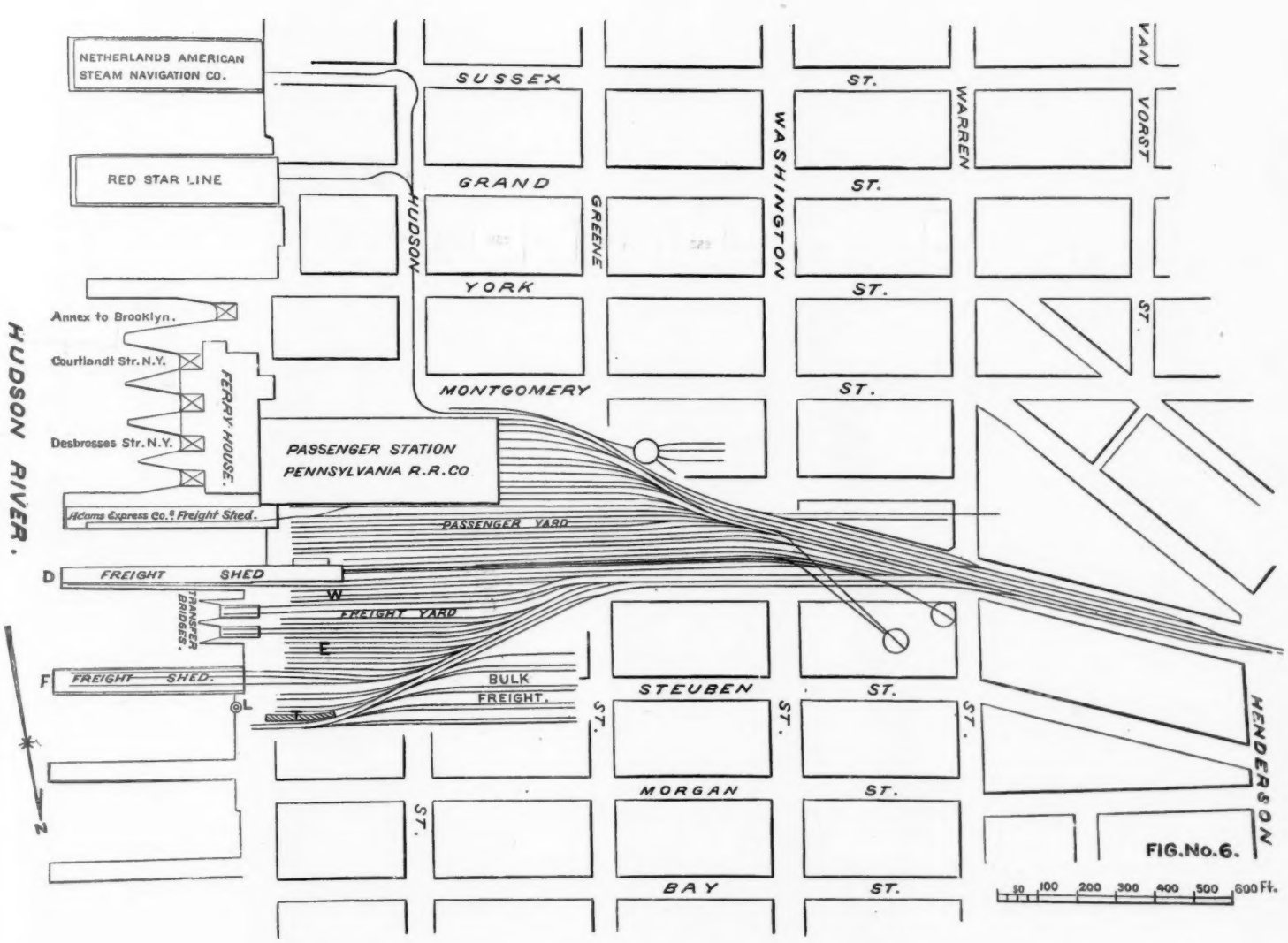
FIG.No.5.

PLAN OF GRAIN ELEVATOR AT HARSIMUS COVE, JERSEY CITY, N. J.

ATION

RAILROAD TERMINAL FACILITIES AT NEW YORK. PENNSYLVANIA RAIL





PLAN OF JERSEY CITY TERMINUS.

RAILROAD.

Besides these there are some small exports to other British colonies, such as the British West Indias, Guiana, etc.

The exports to Spanish American countries and Brazil—that is, all America south of the United States—have been, so far as reported:

	1882.	1883	1884.
Tons	137,418	153,615	135,626
P. c. of total	17.6	19 7	25.0

This was about one-eighth of our consumption in 1883, and not one-twelfth of it in 1882. All these countries but Mexico maintained their consumption very well in 1884, however, and Chili and Peru took more than twice as many then as in either of the other years, though their takings in 1884 were but 14,657 tons in Chili and 5,865 in Peru—together enough for 233 miles of track of 56-lbs. rails.

The exports to specified European countries have been:

	1881.	1882.	1883.	1884.
Tons	54,101	104,298	100,670	60,993
P. c. of total	7.6	13.3	12.8	11.3

As Europe, outside of Great Britain, has about 80,000 miles of railroad, and probably 110,000 miles or more of track, on which the renewals alone (especially as a very large part of it is still iron) are probably 400,000 tons yearly, or more, it appears that only a very small part of the Continental demand can have been supplied from Great Britain. In fact, to Germany, which has more than a third of the Continental mileage, the exports were but 461 tons for the last three years; to France none were reported, and probably there were none; for the rest of Europe Great Britain competes with Germany as well as Belgium, and probably they have the advantage as regards the adjacent countries, as the British exports to Russia have been insignificant in some recent years, and to Austria none are reported, though there may be some included under "unspecified countries."

The rail-importing countries now are the British colonies, Mexico and South America. Only in the colonies is there a large and increasing mileage of railroad, and only from them, as things now go, does there seem likely to be a considerable demand in the near future. In Russia, South America, Mexico, China and Japan there is doubtless room for a great many more railroads, but there is no present prospect of the rapid extension of railroads in any of them.

Growth of New York City Travel.

A company which proposes to add to the means of carrying passengers in New York city has resorted to statistics to demonstrate that there must be a great addition to the facilities because travel grows so much faster than population. The reports of the numbers of passengers carried in each year for a long term of years are compared, and from these it is concluded that while the average growth of population per decade is 46.7 per cent., the increase in passenger journeys is 141.4 per cent.

It is, however, not safe to conclude that the increase will always be at this rate. If so, it will lead to startling results. The number of passenger journeys per inhabitant in 1880 was 175. With an increase in population and travel after 1880 at the above rate, there would be 288 trips per inhabitant in 1890, 473 in 1900, 775 in 1910, 1,271 in 1920, and about 6,400 in 1950, in which latter year New Yorkers will take on the average about 20 car rides daily, and spend (at present fares) something like $5,000,000,000 per year in car fares!

Evidently the increase cannot *always* be at this rate, and the company in question perhaps suspected this when it modestly assumed as a basis for future calculations the period from 1875 to 1880, when the increase in population was 15.4 and in travel 23.6 per cent., and the trips per inhabitant increased from 160 to 175. But even at this rate the journeys per inhabitant would become very numerous in course of time, and nothing can be more certain than that the more rapid rate of increase in travel cannot always continue, though doubtless it has continued so far since 1880.

The truth is that the increase in travel depends on circumstances which vary from time to time in New York as elsewhere. There is a certain period in the growth of such a city when there can be no growth in population without a great growth in the transportation of city passengers; because the town becomes so large that men can no longer reach their work on foot. This comes sooner and lasts longer in a city like New York because the business quarters are to so great an extent sharply and far separated from the residence quarters. Then, as first one and then another quarter is made accessible by street and other railroads, the passenger movement is much greater than the growth of population. But this cannot always continue, and when all inhabited quarters of the city are within reasonable distance of a railroad route, the passenger movement will only about keep pace with the population, unless fares are reduced or the poorer classes become more prosperous. An additional route which serves no additional locality will hardly add at all to the total passenger movement.

It is, however, probable that several cross-town lines in New York city would develop a considerable traffic, and it is also true that the chief elevated railroads are reaching the limits of their capacity, so that it has become a serious question how the future growth of travel over the longer distances from north to south shall be provided for. The four great lines together can carry an immensely greater traffic than they have ever yet had; but two of them are placed where comparatively little traffic goes to them, and the others are already getting choked. The trains are so numerous in the busy hours that no more can be put on, and their size cannot be increased on the present structure. It is not easy to see any way out except by replacing the present structures by stronger ones which will carry locomotives heavy enough to haul longer trains. This is the city traffic most likely to increase rapidly, as the parts of the city where there is much room to grow are on these roads and most distant from the business quarters.

We have reports of January earnings this week from 24 railroads in addition to the 42 that had previously reported. Of the 24 reporting this week, 13 show an increase in earnings, and in the aggregate the 24 have an increase of nearly 3 per cent. in earnings over the unfavorable earnings last year. Nearly three-fifths of the earnings are by two roads, the Grand Trunk and the Wabash, and all the other 22 roads are comparatively small ones.

The aggregate earnings of the 66 railroads that have reported for January so far have been:

	1885.	1884.	Increase.	P. c.
66 railroads	$17,331,017	$16,649,360	$681,657	4.1

There was not much increase in mileage this year, and the gain is the more favorable on that account.

If we compare with years previous to 1884, however, many of the roads reporting this week, as we showed of those reporting last week, do not make a good showing. Below the earnings of some of them in January for four or five years past are given:

	1881.	1882.	1883.	1884.	1885.
Grd. Trunk		$1,380,135	$1,322,673	$1,153,615	$1,113,621
Wabash	$865,339	1,229,965	1,307,783	1,251,083	1,309,564
Alt. & T. H.:					
Main Line.	104.577	107,227	132,093	111,443	95.042
Belle. Line	71,148	66.950	71.892	65.525	57.119
Ev. & T. H.		56,246	53,071	41,165	53,001
Ill. C. in Ill.	511,453	588,260	.....	488,531	488.500
G., C. & S. F.		101,125	173,024	138,414	92,332

Thus the Grand Trunk's small loss this year comes after a large loss last year and a small loss in 1883, so that its January earnings have declined continuously since 1882, and nearly 20 per cent. in the three years. The gain of 4.7 per cent. by the Wabash leaves it with nearly the same earnings as in 1883, but with considerably more than in any other year. The Terre Haute Main Line, which is the Vanderbilt St. Louis line, has smaller earnings than in any other year of the five, not only 17 per cent. less than last year, but 28 per cent. less than in 1883. The Belleville Line of the same company, which with the Illinois Central forms the "Cairo Short Line," one of the chief routes between St. Louis and the South, has not only not shared the prosperity of the Southern railroads, but also has smaller earnings than in any other year of the five, and 20½ per cent. less than in 1883. The Evansville & Terre Haute had about the same earnings as in 1883. The Illinois lines of the Illinois Central, with the same earnings as last year, yielded 17 per cent. less than in 1882. The Gulf, Colorado & Santa Fe shows the effect of two years' bad crops in Texas by a decline of 33⅓ per cent. since last year and of 46 per cent. since 1883.

These lines, most of which earned more than last year, in the aggregate earned much less than in 1883.

On the other hand there are a few roads which earned more this year than ever before, and in most cases the gain this year follows a gain last year. The Cincinnati, Washington & Baltimore gained 16¼ per cent. over 1883, the Fort Scott & Gulf 37 per cent., the Cincinnati Southern 8½ per cent., the Alabama Great Southern 24 per cent.

These are not so large roads as those which have a loss compared with 1883, but they do much to improve the average for the country. Most of them, it will be noted, are Southern railroads.

Chicago shipments eastward were greatly reduced last week by the snow blockades, which affected the railroads both east and west of Chicago for some days, but the western roads most, preventing their bringing in a great deal of freight that would have gone directly east, and, doubtless, reducing shipments at the former's stations. The blockaded grain, being on side-tracks and on the way, will soon get in, and might have made this week's shipments exceptionally large, had there been no new blockades.

The shipments for the week ending Feb. 14 last and corresponding months of previous years have been:

1880.	1881.	1882.	1883.	1884	1885.
38,493	54,105	66,499	58,140	38,732	46,041

Thus, in spite of the blockade the shipments this year were 19 per cent. more than last year, when, however, they were less than in any other year since 1880.

For the last six weeks the Chicago shipments and the percentages going by each railroad have been:

	Week ending Jan. 10.	Jan. 17.	Jan. 24.	Jan. 31.	Feb. 7.	Feb. 14.
Tons:						
Flour	11,836	10,905	7,247	14,914	19,219	11,282
Grain	29,772	42,977	32,995	50,340	52,131	30,913
Provisions	13,003	13,171	10,088	10,483	10,025	3,846
Total	54,611	67,053	50,330	75,737	81,375	46,041
Per cent:						
C. & Grand T.	19.3	15.8	11.0	6.5	7.0	6 4
Mich. Cen.	24.3	29.0	24 4	29.0	8.3	5.8
Lake Shore	9.0	12.3	17.7	21.3	29.4	26.0
Nickel Plate	13.3	8.3	6.4	4.5	3.3	7.4
Ft. Wayne	14 9	7.7	8.8	13 6	20.0	12 8
C., St. L. & P.	6.1	8.4	14.4	7.0	11.0	19.8
Balt & Ohio	7.6	6.3	3.6	7.4	7.8	6.2
Ch. & Atlantic	5.5	12.2	13.7	10.7	13.2	15.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

The decrease from the first to the second week of February was thus 43 per cent., which may have been wholly due to the snow. It is noticeable that the falling-off was proportionally greatest (61½ per cent.) in provisions, which for the most part are the product of the Chicago packing houses, and therefore should not be greatly affected by the blockade of the western roads, except so far as this has deprived the packing-houses of stock. The flour shipments, on the other hand, which originate chiefly at milling towns west of Chicago, were fully equal to the average shipments (though 41½ per cent. less than the week before).

The percentages in such a week are likely to depend largely on the condition of the several roads, but it is noticeable that the roads carrying less than their allotted share are those "over" in the pools. The Michigan Central carried but one-fifth the percentage it carried two weeks before, and not one-sixth of the quantity. The Chicago & Grand Trunk carried little more than half its allotted share; the Lake Shore, the Chicago, St. Louis & Pittsburgh and the Chicago & Atlantic, much more than their shares.

Our large corn crop is now felt very decidedly in our export of hog products, which in January were no less than 66⅔ per cent. more than last year and 30 per cent. more than in 1882. For nine years they have been, in *millions* of pounds:

1877.	1878.	1879.	1880.	1881.	1882	1883.	1884.	1885.
95.2	125.2	126.1	92.0	144.5	104.5	84.0	65.7	109.3

Thus the exports were larger last January than in any other since 1881, and have been exceeded only in three years. Considering the decrease in the stock of hogs naturally occurring after three light corn crops, the recovery has been greater than was to have been suspected. By next fall the stock will have been replenished, and we shall be able to spare as many as in any other year, probably.

There was also an increase in the exports of cattle products in January, from 25,881,000 to 28,107,000, or 9 per cent., which was nearly all in fresh beef.

The *value* of all these products of hogs and cattle (including dairy produce) in January for fiev years has been:

1881.	1882.	1883.	1884	1885.
$15,218,282	$13,200,379	$10,978,825	$9,094,877	$11,865,984

Thus the increase in value over last year is 30½ per cent., but there is still a considerable decrease compared with 1882 and 1881, prices as well as quantities affecting the value.

The corn receipts at the Northwestern markets in the first week of February were larger than ever before in a winter week, and one-half more than in any previous week since August at least. The largest in a winter week heretofore were 3,040,785 bushels, in the last week of January, 1883—a winter when corn receipts generally were very small. In the first week of February this year they were 3,669,275 bushels. The receipts were especially large at St. Louis, though there seem to be no considerable river shipments.

The number of immigrants arriving in the United States in January for the last four years has been:

1882.	1883.	1884.	1885.
18,489	12,940	12,015	11,369

The arrivals are at the minimum in January, and do not afford any criterion of the movement of the year.

At a recent meeting of German iron-masters one of them reported that the Chinese Ambassador at Berlin had recently given an audience to a representative of the German Iron and Steel Association, at which he said the construction of railroads in China would soon be begun—news which greatly interested the German iron-masters, as they expect to be able to supply part, at least, of the rails which will be required.

The usefulness of re-railing safety guards at bridges was illustrated a few days since by a striking incident. On the 10th of the current month, as an express train on the New York, Ontario & Western Railway was approaching the celebrated Lyon Brook viaduct at a speed of 30 miles per hour, on a down grade of 65 ft. per mile, the tire on the leading wheel of the engine truck broke, and the truck was derailed only about 50 ft. from a Latimer bridge safety guard with which guard the entire road was equipped in 1882, soon after Mr. J. E. Childs was appointed General Superintendent. The truck was immediately replaced upon the track on striking the safety guard, and the broken wheel was then held in proper line by the continuous guard rails until the train stopped, which was not until it had passed nearly over the bridge. No damage was done to either bridge or train beyond the breaking of the tire.

The viaduct is one of the largest and highest in the country, 800 ft. long and 165 ft. high, and all the conditions were present (except absence of a safety guard) for one of the worst disasters on record. The wisdom of employing a cast-iron watchman which neither eats nor sleeps nor walks up to the pay car was perhaps never more convincingly demonstrated. Singularly enough, this was the first instance in which any one of the many safety-guards on the line had had an opportunity to justify its existence, but another will hardly be needed very soon, on that line at least.

Yard Master Finucan, of Cleveland, had an unpleasant experience a few days since. When crossing the track in the dark his foot struck against "something smooth and hard and round" which proved to be another "poor fellow's skull" which had been completely severed from the body by a train, while he was using the track as a sidewalk with two other unfortunates whose bodies, with his own, were near at hand.

In many large yards where it is thought impracticable to exclude trespassers completely, this practice is a frequent source of injury to life and limb as well as of annoyance, delay and expense, and a cheap remedy which has proved very effectual in some instances seems worthy of more general adoption. This remedy is simply to ballast the track through the yard with broken stone or furnace slag, which makes walking on the track so uncomfortable as to offer no temptations, while keeping the road-bed in first-class condition. Without something of this kind, or some system of complete exclusion, the temptation to walk between the rails instead of at one side is, as almost every one knows, almost as irresistible to a man as to a cow. Consequently the beaten path, which, it may be admitted, is something of a necessity for the use of employés, is formed in the wrong place.

Record of New Railroad Construction.

Information of the laying of track on new railroads in the current year is given in the present number of the *Railroad Gazette* as follows:

Columbus & Rome.—Extended from Stinson, Ga., northward to Greenville, 8 miles. Gauge, 3 ft.

Louisville, New Orleans & Texas.—The corrected statement elsewhere shows that 16 miles of the *Arkansas City Branch* and 22 miles of the *Greenville Branch* were laid in 1885, being 26 miles more than has been credited to this year.

This is a total of 34 miles, making 102 miles thus far reported for the current year. The new track reported to the corresponding date for 14 years past has been:

	Miles.		Miles.
1885	102	1878	170
1884	155	1877	72
1883	168	1876	99
1882	419	1875	80
1881	173	1874	83
1880	246	1873	226
1879	70	1872	169

This statement covers *main track only*, second tracks and sidings not being included.

The weather has been very unfavorable for tracklaying, and nearly all the new road reported this year has been in the South.

NEW PUBLICATIONS.

Die Verkehrsmittel in den Vereinigten Staaten von Nordamerika. [Means of commuication in the United States,] Von P. F. Kupka, Ingenieur.

Kupka's previous works on the railroads of this country have dealt almost exclusively with engineering questions. His present work on our means of communication deals rather with historical and social questions. It treats not merely of railroads, but of canals, and even of roads, the post-offices, telegraph and banking. It contains much valuable information; but this information is often fragmentary and never thoroughly digested. What he has given us is a series of essays, rather than a connected book, and each of these essays makes the impression of being taken at second hand. In this respect it contrasts unfavorably with the larger and admirable work of MM. Lavoinne and Pontzen.

The first quarter of the book is mainly devoted to canals. This part is good. As was to be expected, Mr. Kupka makes a great deal of use of the material in the introduction to Poor's Manual for 1881; but he does not follow it slavishly, and he has added a great many pertinent facts from other sources. If his history of the Erie Canal were all in one place, instead of being scattered through different chapters, it would be easier to use.

The railroad history is not so good. The very early period is given too much relative importance. Sixty pages are devoted to a detailed account of each railroad existing in the United States in 1840. He says in his preface that the year 1840 marked the close of the first period of railroad building in the United States. We are at a loss to discover exactly why.

The history from 1840 to 1860 he leaves practically untouched. The matter of land-grants he takes up solely in connection with Pacific railroads. Of municipal subscriptions he says nothing, and does very scant justice to the causes which led to the crisis of 1873. His account of railroad consolidation is superficial; he gives a few of the leading facts which any one can see for himself, but does not unfold the causes by which they were brought about. Nor has he anything to say of the men who controlled them. What shall we think of a railroad history which has nothing about Vanderbilt or Tom Scott?

As good points, we may mention, by way of contrast, the accounts of the Granger movement, of railroad pools, of the post-office. In general, our objections to the book are directed, not against the matter itself, but against the form in which it is presented, and against the serious omissions by which it is marred.

The New Orleans Exposition.

The great Exhibition is at length in fair working order, and will well repay a visit. The resources of this country in the production of raw materials, cereals, cotton, fruit, coal, iron, gold, silver, timber, stone and marbles form a magnificent and unequaled display, calculated to inspire the least sanguine with a bright view of the future of the enormous territory containing such a variety and abundance of products useful to man.

The objects exhibited naturally may be divided into three great classes, raw materials, manufactures and art.

The exhibit of raw materials is undoubtedly the finest ever brought together, and far transcends the exhibit of any one country in any previous international exhibit. The same meed of praise cannot be awarded to the manufactures. While the exhibit of raw cotton is, of course, very complete, only the machines employed in the earliest stages of its manufacture are shown with any completeness. There appears to be but one spinning mule and three carding engines shown, and some of the looms are of antiquated and inferior pattern. The fine exhibit of machine tools is placed in an uncompleted building, while a collection of sawmills and brick and tile-making machines are not yet supplied with steam. The exhibition of furniture, wagons, locomotives, passenger cars and agricultural implements are, however, all very good and worthy of a great exposition. The finest display of any manufacture is that of sewing cotton, a specialty, some seven or eight firms supplying the whole world with this small but indispensable article.

It is very generally held that only one of the great international exhibitions ever held has effected a lasting and material change in the tastes and surroundings of the majority of the civilized portion of the human race. The first international exhibition, held in London in 1851, showed English manufacturers that in matters of taste and artistic design they were wofully behind the Latin nations, France and Italy. An effort to make up this shortcoming was the commencement of the present great revival in art, in which Americans have in many departments taken a foremost place.

Artistic ornament and artistic forms in all our daily surroundings are nowhere more highly appreciated than in America, but in no country has the art student less to guide and instruct him. This is especially true in the highest branches of art, painting and sculpture, few good examples of which are accessible to the public.

It might therefore reasonably be expected that the management of the Exposition would have paid particular attention to the art gallery. Unfortunately, however, this building is small and not yet completed. As therefore the pictures are still in their packing cases, it is difficult to estimate their merits as works of art, but apparently artists of the highest repute will be very imperfectly represented, and in this respect the Exposition will be very inferior to its predecessors. We cannot but regard this as unfortunate, both for the country at large and for the pecuniary success of the exhibition. Most people in this country have seen the raw cotton, the ears of corn, the pumpkins, the apples, and even the locomotives and reaping machines that are so numerously represented: but few have seen a Boughton, a Millais, a Claude, a Rembrandt, a Kaulbach, a Delaroche or a Fortuny, and the sight of the works of these great artists, worthy representatives of our own and European countries, would not only prove interesting to the multitude, but would do much to improve artistic feeling, and give valuable help to those engaged in the production of ornamental manufactures. The exhibits of France, Italy, Denmark and Belgium contain, however, much that will be instructive to the latter class. The taste and elegance of the French display is very striking, and cannot fail to impress the most casual observer.

The Mexican exhibit will surprise many who have been accustomed to regard Mexico as a semi-civilized country, and will greatly encourage those who desire to see an interchange of products between the two neighboring republics.

Japan also has an interesting exhibit showing the progressive spirit of this singular people.

Taken as a whole, and remembering the peculiar disadvantages under which the Exhibition labored, it must be pronounced a great success. No previous great international exhibition has ever been held in a city of so small a population as New Orleans. The great exhibitions in London, Paris and Vienna were all held in capitals containing from one to three million inhabitants. Philadelphia at the time of the Centennial had a somewhat smaller population, numbering about 750,000, but New York, Brooklyn, Baltimore and a host of smaller and busy manufacturing cities were close at hand. New Orleans, however, contains only 240,000 inhabitants, and is 700 miles by rail from the nearest city containing over 100,000 inhabitants, St. Louis. Though a want of system and business management is conspicuous in many of the arrangements, yet the buildings are the largest ever erected: and though the interior consists merely of plain, rough, unpainted timber, its immense size, the lofty pillars and long aisles give an idea of dignity and immensity which is often lacking in more costly and elaborate structures. The external elevations must also be pronounced a success, and when the few remaining packing cases have been cleared away, the beautiful greensward and the groves of majestic live oak, with the beard-like Spanish moss swinging pendant from their branches, will make a very beautiful spectacle.

Much has been said as to the wretched, unpaved streets of New Orleans, the bad hotel accommodation, and the difficulty of getting access to the Exhibition. The present writer has found reports on these points to be somewhat highly colored. New Orleans covers an enormous area, nearly every house having its garden, where thickly-clustered oranges may now be seen growing on the trees, and in a few weeks magnolias will be even more plentiful. The large amount of air and space round each house must materially mitigate the heat of summer, but of course enormously increases the area of the town, and it is evidently financially impossible to pave all the streets of a city six times as large as New York, and with but one-fifth of its population. The business portion of the city is certainly better paved than most parts of New York, but in the suburbs the roads are mud and the sidewalks grass. The street cars, however, run on every street of any importance, and their tracks are planked and can be used by pedestrians. A street car is a street car, and cannot be compared to a first-class passenger train; but the New Orleans cars, though bob-tails, drawn by a single mule, are no worse than other street cars, and as New Orleans is perfectly level, the cars go along at a fair pace. The Exposition may also be reached by steamboats, and, did they run on *some definite schedule*, starting every half hour, this would in fine weather be the pleasantest mode of conveyance. Unfortunately each steamer runs independently, with the result that several start with great unpunctuality, but simultaneously, after which there is no boat for two hours. The Illinois Central tracks run alongside the Exposition, and into the heart of the city, and it is said that an expenditure of only $15,000 would have enabled passenger trains to be run regularly to the Exposition at short intervals.

A great exposition, to be successful, must be atte ded by an immense number of visitors, and the conveyance of even 20,000 passengers daily requires a first-class railroad service, and is far beyond the capacity of one or two lines of street cars. Unfortunately, however, the managers of the Exposition did not realize this point in time, and should the number of visitors largely increase, the present mode of conveyance will prove altogether inadequate.

The hotels are not well fitted with modern conveniences, and are already greatly overcrowded, but many of the inhabitants are perfectly willing to let their spare bedrooms, and as restaurants of every class are plentiful, a visitor can stay in New Orleans very comfortably without troubling the hotels.

Without entering at present into any detailed description of individual exhibits, the following may be mentioned as among the exhibits especially noteworthy and interesting to those engaged in the working of railroads or the inception of projects for new lines of railroad.

The United States General Land Office and the office of the Commissioner of Railroads show a very fine and interesting collection of large maps and diagrams, specially designed to show graphically the growth and mileage of the railroads of this country at different periods, and the proportion the mileage in different states bears to the area, population, and wealth of those states. The diagrams and maps are especially complete as regards lines west of the Mississippi, distinguishing the roads which have and have not received land grants or subsidies, or both. The former are in a decided majority. Unfortunately, none of the maps show clearly the extent of territory given in land grants to railroads.

A series of very beautiful photographs show the scenery on the Union Pacific, Denver & Rio Grande and other mountain lines. Other photographs show the standard types of engines and cars on the Pennsylvania Railroad.

The Richmond & Danville, Georgia Pacific, East Tennessee, Virginia & Georgia and Chicago, Milwaukee & St. Paul railroads send fine exhibits of the products of the states through which their respective lines run. These exhibits are all situated near the northern entrance of the building containing the government and states exhibit, and are very complete and varied, and excellently arranged. The first three roads named exhibit a wonderful variety of beautiful specimens of nearly 200 distinct kinds of hard wood. In addition to this, an exhibit in itself, are shown a great variety of iron ores, limestone (furnace flux), coal (one block from the Warrior Field weighing 14 tons), coke, charcoal, manganese ore, copper and copper ore, pyrites, asbestos, mica, kaolin quartz, feldspar, tin ore (recently discovered in King's Mountain), slate, zinc ore, gold-bearing quartz, and a great variety of fine marbles, both from Tennessee and Georgia.

The Chicago, Milwaukee & St. Paul sends a fine collection of wheat, corn, etc., grown near its lines. The Atchison, Topeka & Santa Fé sends iron and copper ore, chiefly from New Mexico. The Chicago, Burlington & Quincy also contributes products of the territory it covers. The Denver & Rio Grande sends a number of photographs of the magnificent mountain scenery along its lines, and many minerals from Colorado, and a curious realistic scene representing a characteristic Colorado farm, with the Mount of the Holy Cross in the background, and the entrance to the famous Royal Gorge.

The Central Pacific exhibits products of California and Nevada, with photographs and blue prints of its Mastodon engines, already illustrated in the *Railroad Gazette*. It also sends an enormous plank of redwood, and a section of and original big tree from Mariposa.

The Louisville & Nashville sends a fine collection of iron ores and timber, chiefly from Alabama.

The Baltimore & Ohio contributes a very fine collection of photographs taken along its lines, and some interesting specimens of early railroad tickets, etc., and a model of the Cooper, claimed to be the first American locomotive.

The Cincinnati, New Orleans & Texas Pacific exhibits a full-size section of its track, showing rock ballast, joints, ties, etc. It is understood that a locomotive made at its shops, entirely of materials found along the line of this road, was also to be exhibited, but it is not yet in position.

The Decauville system of portable railroads is shown in full operation, both inside and outside the main building, and deserves the careful attention of those engaged in the construction of railroads.

Pullman's Palace Car Co. exhibits a fine model of its works and of the town of Pullman, Ill.

The natural features and railroad system of Florida are shown by an excellently executed model in relief. This state also shows one of the finest and best arranged collections of hardwoods shown, the leaves of each tree, the locality where found, the use made of the timber, and other particulars being given with each specimen.

The exhibition of locomotives comprises most of the usual types, and embraces engines of widely different weights and sizes. The Baldwin Works send four engines, two being of the American type, with 16-in. cylinders, one ten-wheeler with 18-in. cylinders, and a mogul with 19-in. cylinders. The Rogers Locomotive Works contribute an American type passenger engine, with 17-in. cylinders.

The Pittsburgh Locomotive Works send two American type engines, one with 16-in. and the other with 18-in. cylinders. The Rhode Island Locomotive Works send two American type engines, one of which is for the narrow gauge. H. K. Porter & Co., of Pittsburgh, send a small logging locomotive, and the Lima Machine Works contribute one of E. Shay's patent geared engines, which is employed in switching about the grounds.

The Roanoke Machine Works send the largest engine and the only consolidation engine in the Exposition. It is built for the Norfolk & Western, and has 20-in. cylinders. They also exhibit a box car, and a gondola car built for the same road.

The exhibit of passenger cars is not large, but is fairly representative. Messrs. Jackson & Sharp send a Woodruff sleeping car and a Mann boudoir sleeping car. Pullman's Palace Car Co. is represented by a parlor car, and the Harlan & Hollingsworth Co. by a day coach.

The Chicago, Milwaukee & St. Paul sends a postal car fitted with Harrison's folding bag racks. This car is standing outside of the western entrance of the government building, and is not with the other cars in the northwest corner of the main building.

The Army Medical Department sends models of a complete train of hospital cars, as used in the war. A model of a car for conveying fish eggs is also shown in the government exhibit.

Four refrigerator cars are exhibited, two being constructed on Wickes' principle, one on Tiffany's and one on Hutchins'.

In addition to the two freight cars contributed by the Roanoke Machine Works, the Tube Rolling Stock Co. exhibits two cars, a box and a gondola, constructed according to its patents. The remaining freight car was built for the Michigan Central by the United States Rolling Stock Co., of Urbana, Ohio.

The Pennsylvania Railroad sends a special car which carries the "Liberty bell," an interesting contribution to the Exposition from the City of Brotherly Love.

The only foreign exhibit in rolling stock is a small tank engine sent by a Belgian firm, "Ateliers de Tubize." It is intended for working suburban rapid transit passenger trains, and is accompanied by a small four-wheeled passenger car, with iron frame.

Another Belgium firm exhibits a system of portable railroads, and John Cockerill, of Seraing, shows some locomotive driving-wheels, etc.

The Lobdell Car-Wheel Co. exhibits several car wheels, and the Eames Vacuum Brake Co. exhibits its apparatus at work.

Any notice of many other interesting exhibits in machine tools, wood-working machinery, paints, varnishes, pipes, and various railroad supplies, must be deferred to a future article.

The furniture-making firms of Grand Rapids, Mich., show a fine exhibit in a special pavilion. Some very elegant and costly furniture is also shown in the British exhibit.

A majority of the states contribute splendid collections of lumber, of all kinds and varieties, some immense specimens of cypress, etc., being sent by Mississippi, Arkansas, and other Southern States. The Exposition contains an unequaled collection of timber, in itself a study for several days, and we must hope to deal with it more fully in a future article.

The Kentucky display is possibly the most backward of any of the states, but is remarkable for a comprehensive series of very fine and delicate photographs of the scenery and products of the state, a portrait of Mary Anderson naturally occupying the place of honor.

Notes in Virginia.

RICHMOND.

THE CHESAPEAKE & OHIO SHOPS.

The principal shops of this line are situated at Huntington, W. Va., but a great deal of repair work is done at Richmond, where the general offices of the company are situated. These shops are old, many of them wooden frame buildings, and the amount of ground available is insufficient to allow for extension, and possibly at some future time new and more convenient shops may be erected at Newport News, the Atlantic terminus of the line.

The road has heavy grades, one of no less than 143 ft. to the mile, while a stretch of 14 miles is on a grade of 78 ft. to the mile.

As the haulage of coal is the mainstay of the company's business, it is not surprising that the standard freight engines are of the consolidation type, with 20 in. × 24 in. cylinders.

The Superintendent of Motive Power, Mr. E. L. Chapman, is fitting a passenger engine, undergoing heavy repairs, with several improvements, some of which have been in use for a few months. The lagging is of asbestos, and is expected to prove more durable than wood, and is, of course, not liable to damage from sparks. It is applied direct to the surface of the boiler, some asbestos being mixed with lime and water, so that it may be laid on with a brush. This forms a first coat, and others are added of the consistency of mortar until the boiler is covered with a coat 1½ in. thick at the front end, diminishing of course towards the hind end. The cost for asbestos for one engine without labor is about $25. The radiation of heat would probably be less were a greater thickness used.

As bituminous coal is used, the proper admission of air to the fire is essential to secure complete combustion. In the engine in question great care has been taken to obtain perfect combustion without smoke, so as to obtain the full evaporative value of the coal. Besides the usual extension front, and brick arch supported on water tubes, the engine is fitted with a peculiar fire-door deflector, and means for admitting the air at the sides of the ash-pan, it being intended to use the doors at the ends for cleaning only. The sides of the ash-pan are perforated with oval holes at regular intervals, and plates with corresponding holes fit snugly against the sides of the ash-pan, and can be moved longitudinally so as to cause the holes to coincide, if a full admission of air is desired. When the slide is moved so that the holes do not coincide, of course the air is shut off. It is believed that this method will give a more equal distribution of air to the different parts of the grate. It will also probably obviate the difficulty often felt now in making engines steam with a strong side wind.

The deflector is so geared with the fire-door that it lifts when the door is opened, and thus allows coal to be put on. When, however, the door is closed, the deflector falls toward the door. As the deflector is only exposed to the full effect of the flame when the fire-door is open, it is expected to last longer than those fixed in the English fashion. The dome and sand-box have easy wires at the top and base, without any heavy moldings. The cylindrical portion is composed of No. 11 iron, covered with planished iron, on which the number of the engine is painted for freight service, and put with gold leaf for passenger service.

The whistles used for passenger service are of somewhat peculiar construction, and give a sound which is easily distinguished from any other whistle. A passenger train can thus herald its approach without any fear of being mistaken for a freight train.

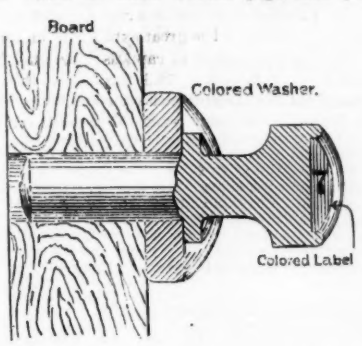
The engine truck boxes are provided with a dust-guard working in a suitable pocket in the oil cellar. This guard of course only bears against the lower half of the journal, and fills the gap usually left between the under side of the journal and the oil cellar when the bearing is worn. The dust-guard is kept up by a small flat spring resting on the bottom of the dust-guard chamber.

All the tenders have plainly marked on their sides the capacity of the tank in gallons. The standard tender holds 3,400 gallons. This is a useful feature, deserving of general adoption on roads having many different classes and sizes of tenders.

A neat arrangement is used to prevent the injectors flying when the water-level is low. An iron flap with a leather hinge is placed in the bottom of the tank near the feed-pipe. This flap is slightly inclined from the vertical, so that when there is a flow of water through the feed, the flap tends to keep closed. It opens, however, toward the feed, and consequently toward the engine, and therefore the suction of the feed keeps it open. When, however, a quick stop causes the water to surge backward, and deprive the injector of its supply, the flap closes and retains enough water immediately above the feed-pipe to keep the injector going until the water surges forward again.

The passenger cars have heretofore been painted a bright yellow shade, but this has not proved a suitable color for a road having some eleven miles of tunnels and burning a smoky coal. A mixture of three parts of goden ochre and two parts ivory black is now tried, and has so far given good results, standing well and not showing the dirt. With a little plain gold striping and figures, the rich dark olive-green has a very handsome appearance.

The Superintendent of Motive Power has, as usual, an engine indicator in his office, which gives all the information generally required, and is not expensive to get up. It is composed as usual of a board perforated with a number of holes, in which fit small wooden pegs, each peg indi-



cating an engine. A piece of colored paper pasted on the outer end of each peg carries in bold figures, the number of the engine in smaller type, the size of the cylinders and the number of wheeels coupled. The color of this piece of paper indicates the division or road owning the engine. The pegs are shouldered down where they enter the board, and carry a washer, the color of which indicates the condition of the engine. The board is divided thus, the stars indicating the position of the pegs:

WESTERN DIVISION.

Passenger.....	*	*	*	*	*	*
Through freight..	*	*	*	*	*	*
Local freight. .	*	*	*	*	*	*
Switching.....	*	*	*	*	*	*
Shops	*	*	*	*	*	*
Other service.....	*	*	*	*	*	*

The position of the peg thus indicates the service of the engine and the division on which it is engaged, while the movable washer indicates that variable factor, the condition of the engine, while the fixed colored labels indicate the elements of the engine which do not vary, its main dimensions, original owners and class.

TECHNICAL.

Bridge Notes.

A dispatch from Buffalo, N. Y., Feb. 18, says: "This week, for the first time in four years, the Union Bridge Co. of this city shuts down, throwing 200 men out of employment. The shops at Athens, Pa., will be kept running on full time, and it is thought that sufficient business will be secured before their contracts are finished to again start up in this city. The company have just finished a bridge 2,400 ft. long over the St. Croix, near St. Paul, for the Wisconsin Central Railroad. Several large contracts for the Chicago, Milwaukee & St. Paul, the Chicago, Burlington & Quincy and the Illinois Central are now being finished and shipped. A bridge 1,400 ft. long has just been finished over the Arkansas at Little Rock, and a contract has been made for another bridge 2,000 ft. long at Van Buren, Ark. The Athens shops now has under way a bridge to span the Ohio at New Albany, Ind., 2,453 ft. long, with two cantilever spans of 483 ft. each; also a drawbridge 360 ft. long for the St. Louis, Iron Mountain & Southern Railroad over the Arkansas River."

Iron Notes.

The South Tredegar Iron & Nail Works, in Chattanooga, Tenn., have started up again, having received some heavy orders for spikes. The nail department also will shortly be in full blast.

The furnace of the Crown Point Iron Co., Crown Point, N. Y., will be blown out shortly for repairs. The company's other furnace will be started up about the same time.

The blast furnace of the Low Moor Iron Co., at Low Moor, Va., was in blast last year 277 days, making in that time 31,741 tons of pig iron. The furnace went out of blast for repairs Aug. 17, and started up again Nov. 17. The largest output in one day was 141½ tons. The furnace used during the year 46,000 tons of iron ore, 34,000 tons of limestone and 70 tons of coke.

The Glendower Rolling Mill, at Danville, Pa., has been leased by the Danville Furnace Co., and started up.

The Bessemer steel works of the Albany & Rensselaer Iron Co., in Troy, N. Y., have been started up, and the company will this week also start its rail mill, which has been idle since August last.

A dispatch of Feb. 16 to the Pittsburgh *Chronicle-Telegraph* from Youngstown, O., says: "The prospect for business among the rolling mills here is very much improved. Cartwright, McCurdy & Co. and the Youngstown Mills have started everything on double time, while at the big mills of Brown, Bonnell & Co. everything goes on double time, except the puddle mills. To-morrow the mills of Andrews Bros. & Co. at Hazelton and Struthers' mill will go on double turn. Two furnaces connected and owned by Brown, Bonnell & Co. will soon be blown in, as pig iron is getting scarce. Only a part of the works at the Valley Mill is going, but before the end of the week it is expected that everything will start. The Trumbull Iron Company at Girard has closed a large contract for their specialties, and are running full. The Wood mower and reaper works started this morning in all the departments. The members of the firm of Arms, Bell & Co., which concern was attached by the Sheriff on Saturday for judgments of $10,000 by the Continental National Bank here, state that there are ample resources to meet all outstanding obligations."

The rolling mill of the Union Pacific Railroad Co., at Laramie, Wyo., has been leased to Mr. F. E. Scrimser, who will put the mill in active operation.

The plate mill of the Nashua Iron & Steel Co., at Nashua, N. H., was destroyed by fire Feb. 7. The mill was 200 × 85 ft., and contained some valuable machinery. The loss is partly covered by insurance.

The Ajax Forge Co., in Chicago, is very busy, running its works to their full capacity on frogs and crossings, and on car links and pins.

Manufacturing and Business Notes.

The partnership existing heretofore under the name of Penfield Block Co., at Lockport, N. Y., has been dissolved by mutual consent, and the same persons have formed a corporation under the old firm name. The new corporation succeeds to all the business property, good will, etc., of the firm, and will adjust all unsettled accounts and carry on the same business in the same factory and with the same facilities. The new corporation has elected the following officers: President, A. S. Beverly; Vice-President, Jesse Peterson; Secretary, Z. W. More; Treasurer, M. H. Tarbox.

The Deane Steam Pump Co., in Holyoke, Mass., has re-elected W. J. Harris, President; Charles P. Deane, Treasurer, and the old board of directors.

The Dickson Manufacturing Co., in Scranton, Pa., is building a 42-in. air-compressor for the Calumet & Hecla Mining Co. It is also building a new switching machine for the Brooklyn Bridge, and have a number of orders for coal-mining machinery.

The Jonson Foundry & Machine Co., of New York, has furnished the iron work for the cable railroad station at Fourth avenue and 128th street in New York, and also the grips for the cars on the cable railroad in 125th street. The company is also making the grips for the cars on a cable road in San Francisco.

The Flagg safety gate for road crossings is now in use on 138 different railroads. These gates, as now made by the Jonson Foundry & Machine Co., in New York, are so arranged that they cannot freeze and will work in the coldest weather.

The Rail Market.

Steel Rails.—The market still continues quiet and orders are limited to small lots, which have generally been taken at about $28 per ton at mill. Some of the mills are getting anxious for additional orders, and good orders could readily be placed at $27, possibly at less. A good many orders could be placed if manufacturers were willing to take bonds in part payment; but they are not generally disposed to do so, and parties who are able to pay cash are said to be holding off in the hope of getting lower prices.

Rail Fastenings.—Quotations remain at 1.9@2 cents per lb. in Pittsburgh for spikes; 2.25@2.65 for track bolts, and 1.65@1.75 for splice bars. The market is still very dull and few orders are reported.

Old Rails.—Demand is a little more active and prices are firmer. Sales of old iron rails are reported at $17.50@$18 per ton at tidewater, with a disposition to ask higher prices. Old steel rails are quoted at $15.50@$16.50 per ton in Pittsburgh, according to length.

British Rail Exports.

For the month of December and the 12 months then ending, the exports of steel and iron rails from Great Britain to the United States and to all countries are reported as follows by the Board of Trade for the last three years, in tons of 2,240 lbs.:

	December.			12 months.		
	1882.	1883.	1884.	1882.	1883.	1884.
To United States:						
Iron rails... .	8	100	0	21,134	2,035	7
Steel rails	6,734	5,767	0	173,873	69,343	17,476
Total	6,742	5,867	0	195,007	71,378	17,483
To all countries:						
Iron rails.....	1,810	1,087	1,745	46,824	24,306	15,581
Steel rails.....	46,503	54,221	32,771	734,959	754.108	526,169
Total.	48,313	55,308	34,516	781,783	778.414	541,750

This is the first month in which there have been actually no exports to the United States since 1878 or the early part of 1879; but in September last they were only 7 tons, and in May only 50. The exports for the year 1884 to this country were about one-fourth those of 1883, and *one-eleventh* those of 1882.

The exports to other countries have also fell off greatly in December compared with 1883 and 1882, but for the year they were only 11 per cent. less than in 1882.

Blast Furnaces of the United States.

The *Iron Age* says: "In another column we give our monthly report of the condition of the anthracite and bituminous furnaces of the United States on Feb. 1, 1885. The table, in a condensed form, presents the following:

	In blast.		Out of blast.	
Fuel.	No.	Weekly capacity.	No.	Weekly capacity.
Anthracite.....	81	21,189	139	31,955
Bituminous..	87	41,491	136	50,766

"As compared with the report for Jan. 1, 1885, this shows

a decrease of five anthracite furnaces in blast, and an increase of one bituminous in the month of January. One anthracite furnace has gone out in New Jersey, two in the Lehigh Valley, one in the Schuylkill and one in the Upper Susquehanna. Among the bituminous districts there have been several changes, some furnaces going out, others going in. The total result is an increase of one stack in blast. This indicates that there has been no material change in the status of these furnaces since the beginning of the year.

"Comparision has shown in the past that our figures of capacity do not vary much from the actual work. If this is true, our table indicates that we are producing anthracite iron at the rate of 1,101,828 tons a year, and bituminous at the rate of 2,157,532 tons. In 1884, according to the estimate of Mr. Swank, we made 1,586,000 tons of anthracite and 2,541,000 tons of bituminous. If our estimate is correct our present rate of production is much below the average of 1884, being 500,000 tons of anthracite and 400,000 tons of bituminous less."

Western Society of Engineers.

The 202d meeting was held in Chicago, Feb. 3, President Williams in the chair.

Mr. Wright read a paper, the Ventilation of Stables.

The Secretary read a letter from Vice-President Chanute, containing several suggestions for increasing the efficiency of the Society.

It was voted that these recommendations be referred to a committee, which should report at the next meeting. The President appointed Messrs. Morehouse, Artingstall and Wright as this committee.

Mr. Cregier offered the following, which was adopted by a rising vote:

"*Resolved*, That this Society has heard with profound regret of the death of the late John B. Jervis, whose eminence in the domain of engineering and long and successful service have endeared him to the profession everywhere.

"*Resolved*, As a token of respect to the memory of the distinguished dead that this resolution be entered upon our records."

Adjourned.

Engineers' Club of Philadelphia.

A special business meeting was held in Philadelphia, Jan. 24, President J. J. De Kinder in the chair, 31 members present.

The resignations from active membership of Messrs. Walter Atlee, F. W. Dean, W. H. Heuer, A. B. Stovell and J. C. Turk, were read and accepted.

The tellers of election, Messrs. J. E. Codman and T. C. Smith, reported that the following gentlemen were elected active members of the Club: Messrs. Charles M. Jarvis, Samuel J. Creswell, Joseph S. Ward, H. W. Dunne, Wm. M. Levering, Chas. P. McArthur, John B. Fontaine, Geo. G. Hood, John D. Newbold, T. A. Reilly, P. W. Taft and C. H. Middleton, Jr.

On motion of the Secretary, the President was authorized to appoint tellers of election of members in advance of the meeting for election, and the said tellers were authorized to receive and count, in advance, such portion of the letter ballots as may be received prior to the opening of the meeting.

Mr. John C. Trautwine, Jr., exhibited and described drawings of a large land dredge built by the Osgood Dredge Co., of Albany, N. Y., for the Pacific Guano Co., to be used in removing 8 to 15 feet of material from the phosphate rock at Bull River, S. C.

The more prominent features of the machine are the carbody, the water-tank, boiler and engine, the A-frame (so called from its slight resemblance to the letter A), the boom, the dipper-handle and the dipper, drawings of which were shown and described in detail.

Mr. Chas. T. Thompson presented a Description of the Construction and Manner of Turning of the Large Hoisting Drums of the Calumet & Hecla Mining Co. These drums were designed by Mr. E. D. Leavitt, Jr., of Cambridgeport, Mass., for the Calumet & Hecla Mining Co., of Michigan, and were constructed by the I. P. Morris Co., of Philadelphia. They were three in number. They are 20 ft. 4½ in. in diameter at the pitch line of rope, 8 ft. 3 in. wide on face of winding surface, and 10 ft. over all. They run loose on shafts of Nashua steel, 15 in. diameter. The rim of the drums is of cast iron, and is in 8 segments, held together by 18 1⅛-in. fitted bolts for each joint. The hub is of cast iron, 9 ft. 9¼ in. long, and is made in two pieces, held together by 20 1⅛-in. reamed bolts, and 24 1¼-in. bolts. It is lined with Babbitt metal, which extends over the ends, so that all moving parts have a wearing surface of the material.

One of the peculiarities of these drums is that they depend almost entirely on compression to retain their shape. The rim is held in its position to the hub by 48 2¼-in. stays, which are fastened to the hub. There are besides 16 1⅛-in. stays, running diagonally from one edge of the drum to the opposite side of the hub, for stiffness. The weight of the car for which this drum is intended is two tons; weight of load, two tons; weight of rope, 2½ pounds per foot; length of shaft, 4,000 ft.; incline, 39°; dead weight to be started by drum, 18,000 pounds.

The drum runs 20 revolutions a minute, giving a speed of skip of 1,280 ft. per minute. Total weight, 142,713 pounds.

Mr. Thompson also read an interesting letter from Mr. Henry A. Vezin, alluding to Iron Mining Methods in Colorado.

The Secretary was enabled to present, through the courtesy of Samuel C. Perkins, Esq., who had loaned it for the purpose, a description of the so-called Artesian Wells of New York City, embodied in a written report thereupon by Dr. Cyrus Edson, Chief Inspector of the Health Department.

Electric Locomotives.

The American Electric Railway Co. has filed certificates of incorporation in New York, with Cyrus W. Field and others as corporators. The company is organized to build, own, sell or let locomotive engines to be operated by electricity, and also cars and other railroad machinery.

The Turner-Beard Freight Brake.

A trial of the Turner-Beard automatic momentum brake has been made on a freight car of the Boston & Providence road, which is now on exhibition in the Boston yard of that road. The brake is one of the class intended to be operated by the momentum of the train. The motion of the drawbars, when the locomotive is checked, brings a pulley into contact with a friction roller on one of the axles of the car. This pulley is on one end of a short horizontal shaft, the revolution of which turns a chain which sets the brake, and so far the invention resembles several other brakes of this class which have been patented. The peculiarity of the present brake consists in a pair of short iron levers set near the friction pulley, parallel with the axle, and weighted at one end. The revolution of the axle causes the heavy end of these levers by centrifugal force to stand out, and the light end to rest against the axle. A lever, or crank, is so placed as to be moved by the heavy ends, and a swinging dog by the light ends, and these put the other part of the apparatus in position for action, no matter which way the train is moving. The description of this brake cannot be made very clear without a drawing. It is claimed for it that it can be placed upon a car without any alteration of the present running gear, and without interfering with the hand-brakes; that it is cheap and not complicated, and that it can be so adjusted as not to be affected by any irregularities or sudden changes of movement. It does not appear, however, that it will avoid the difficulties which have heretofore prevented the general use of brakes of its class. It will be given an extended trial on the Boston & Providence road, in the course of which its merits and defects will probably be pretty thoroughly brought out.

A Train Fire Extinguisher.

Haven's patent steam fire extinguisher, manufactured in Paterson, N. J., as applied to a locomotive on the Erie road, has been used with much success in extinguishing a fire caused by the explosion of an oil tank, and its use is reported to have, on other occasions, assisted in saving property. An apparatus of this kind attached to a locomotive is certainly a very desirable thing, and would be the means of saving property and lives in the many accidents which are accompanied by the destruction of cars by fire.

The Tehuantepec Ship Railway and the Suez Canal.

Engineering has recently published a full and approving description of Captain Eads' proposed shiprailway at Tehuantepec, which ends with the following statement: "To us the scheme appears perfectly feasible, and it only needs that it be carried out quickly and carefully. Commerce is timid; the inaugural car must make its journey as safely and easily as the thousandth, and then it may be expected that day by day the marvelous procession will be kept up, and a feat will have been performed which will stand out in bold prominence even in the crowded page of nineteenth century achievements." *Engineering* gives the actual tonnage in 1883 of other routes which would be shortened by the ship railway 4,842,111 tons, and from the rate of growth in traffic since 1879, it estimates 7,500,000 tons for 1889, $2 per ton on which, it is estimated, would pay 10 per cent. on $75,000,000. The average tonnage dues on the Suez Canal are $1.65 (1882) to $1.78 (1880). The increase of revenue on the Suez Canal for the 11 years 1873-83, by the way, has been remarkably uniform from year to year, at an average rate of increase per year of over 11 per cent., the total increase having been 264 per cent., as will appear from the following table, to which we have added a column showing what the revenue would have been at an exactly uniform ratio of growth. The apparent break in the years 1878–80 is due to a reduction of rates, which had a temporarily unfavorable effect. The actual revenue is in each case a little less than the computed, indicating that the growth has been not only in an unbroken geometrical ratio, but in an almost uniformly increasing ratio, except for the temporary irregularity due to the reduction in rates:

Revenue and Tonnage of Suez Canal.

Year.	Tonnage.	Revenue. Actual.	Computed geometrical ratio.	Difference. (All deficiencies of actual below computed ratio.)
1873.....	.....	£915,893	£915,893	.....
1874.....	.....	994,475	1,022,000	£27,600
1875.....	.....	1,115,432	1,140,400	25,000
1876	.....	1,199,000	1,272,500	73,500
1877.....	.....	1,311,093	1,420,000	108,900
1878.....	.....	1,243,929	1,584,400	340,400
1879	.....	1,187,422	1,768,000	580,600
1880	4,344,520	1,592,419	1,972,850	380,400
1881.....	5,794,401	2,050,974	2,2 1,400	150,400
1882	7,122,133	2,421,835	2,456,400	34,600
1883.....	.....	2,740,934	2,740,934	.....

The revenue for the year 1884 has been again affected by a reduction of 10 cents per ton in rates and shows but little increase.

Radical Enlargement of the Erie Canal.

Mr. E. Sweet has recently presented a paper on this subject considering in some detail the feasibility and cost of enlarging the Erie Canal to a channel 18 ft. deep, 100 ft. wide at bottom and with locks 450 ft. by 60 ft., so as to pass the largest vessels now navigating the lakes. The project contemplates a continual descent from Lake Erie to the Hudson, the water supply being wholly from the lake. The following is a rough outline of the scheme, which includes the canalization of the Mohawk River from Utica to Troy, and some improvement of the upper 30 miles of the Hudson River:

	Miles.	Locks. No.	Locks. Total lift.
First level, Buffalo to Lockport.....	32	2	50
Second " to Brighton.....	64	2	48
Third " to Macedon.....	20	1	20
Fourth " to Newark.....	12	1	20
Fifth " to Utica	115	..	..
Mohawk River, to Troy.....	100	ab't 40	422
	343		560

The cost is estimated at $125,000,000 to $150,000,000, or $4,375,000 to $5,250,000 per year interest at 3½ per cent., and its probable tonnage at 20 to 25 million tons per year. The discussion of the project was, in the main, favorable, but the usefulness of such a canal in competition with railroads and the St. Lawrence River was questioned by several members.

Cast-Iron Car Wheels in Europe.

Ganz & Co., manufacturers of chilled cast-iron car wheels in Buda-Pesth, Hungary, have written to *Glaser's Annalen* that they guarantee their wheels for ten years; that the demand for them has increased steadily for the last five years, that they turned out 243,293 down to 1883, and that of 150,000 of their wheels in use on the railroads of Austria and Hungary *not one* broke last year.

Railroads in Peru.

Grace Brothers & Co. have taken a contract to extend the Lima & Oroya road from its present terminus, 80 miles from Lima, Peru, to the famous silver mines at Cerro de Pasco. The distance is 30 miles only, but the work will be very expensive, as it is nearly all through an extremely difficult mountain country. The Lima & Oroya road was originally intended to reach these mines when the contract was first taken by Henry Meigs.

Pig-Iron Production in 1884.

From returns to the American Iron & Steel Association it appears that the total production of pig-iron in the United States last year was 4,589,613 tons, against 5,146,972 tons in 1883. The number of furnaces in blast on Jan. 1, 1885, was 236, against 307 at the beginning of the previous year, and 417 on Jan. 1, 1883. The number of furnaces out of blast Jan. 1, 1885, was 433. The production of charcoal pig iron last year was 458,418 tons, against 517,726 tons the previous year; of bituminous coal and coke pig iron, 2,544,742 tons, and of anthracite pig iron, 1,586,453 tons. The stocks of pig iron unsold on Jan. 1, 1885, amounted to 593,000 tons, against 533,000 tons on Jan. 1, 1884.

Cable-Road Contracts at St. Louis.

On Jan. 22 the St. Louis Cable & Western Railroad Co. contracted with a number of firms for work to be completed by June 1, on which date the road will be thrown open to the public. The Brownell & Wight Car Co., of St. Louis, were given the contract for 24 passenger coaches of the most improved pattern, to be upholstered, and for 15 grip cars. Smith, Beggs & Ranken were given the contract for a 300 H.-P. engine and for three boilers, each 20 ft. long and 60 in. in diameter. Fulton Iron Works, St. Louis, contracted for the winding machinery, pulleys, etc. The New Albany Rail Mill Co., of New Albany, Ind., took the contract for manufacturing the conduits. These will be of iron and steel: they will weigh altogether 1,900 tons, and will consist of 18-foot sections. It will be some time in February when the streets will be torn up and the conduits laid. The contract for the cable was secured by John A. Roebling's Sons & Co., Trenton, N. J. The cable will consist of 34,500 ft., in one piece, and will be of the best material. It is to be delivered at the cable company's power house on May 1.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Camden & Atlantic, annual meeting, at the office in Camden, N. J., Feb. 26.

Cleveland, Columbus, Cincinnati & Indianapolis, annual meeting, at the office in Cleveland, O., at 10:30 a. m., on March 4.

Delaware, Lackawanna & Western, annual meeting, at the office, No. 26 Exchange place, New York, at 10 a. m., Feb. 24.

Grand Rapids & Indiana, annual meeting, at the office in Grand Rapids, Mich., March 4.

Housatonic, annual meeting at the office in Bridgeport, Conn., Feb. 27.

Illinois Central, annual meeting, at the office in Chicago, March 11.

Lehigh Coal & Navigation Co., annual meeting, in the Board of Trade rooms in Philadelphia, at 11 a. m., Feb. 24.

Missouri Pacific, annual meeting, at the office in St. Louis at 9 a. m. on March 10.

Northern Central, annual meeting, at the office in Baltimore, Feb. 26, at noon.

Pennsylvania Railroad, annual meeting, in Musical Fund Hall in Philadelphia, at 11 a. m. on March 10.

Texas & Pacific, annual meeting, at the office No. 195 Broadway, New York, March 3, at noon.

Wabash, St. Louis & Pacific, annual meeting, at the office in St. Louis, at 9 a. m. on March 10.

West Jersey, annual meeting, at the office in Camden, N. J., March 3, at noon.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Delaware & Bound Brook (leased to Philadelphia & Reading), 2 per cent., quarterly, payable Feb. 16.

Freehold & Jamesburg (leased to Pennsylvania Railroad Co.), 8 per cent., payable March 9, to stockholders of record on March 2.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *National Association of General Passenger & Ticket Agents* will hold its next meeting in New Orleans, on Tuesday, March 17.

The *Southern Time Convention* will hold its spring meeting in New Orleans, Wednesday, March 25.

The *General Time Convention* will meet at the Lindell Hotel, in St. Louis, on Wednesday, April 8.

The *Association of American Railroad Superintendents* will hold its half-yearly meeting in Richmond, Va., on Wednesday, April 15.

The *American Association of Train Dispatchers* will hold its annual convention in Denver, Col., on Wednesday, June 3.

The *Master Car-Builders' Association* will hold its annual convention at the Hygeia Hotel, Old Point Comfort (Fortress Monroe), Va., beginning on Tuesday, June 9.

The *Master Mechanics' Association* will hold its annual convention in Washington, beginning on Tuesday, June 16.

The *Car Accountants' Association* will hold its annual convention at Minneapolis, Minn., beginning on Tuesday, June 23.

The *Master Car-Builders' Club* will hold regular meetings at its rooms, No. 113 Liberty street, New York, on the evening of the third Thursday in each month.

The *New England Railroad Club* will hold its regular meetings at its rooms in the Boston & Albany station, in Boston, on the evening of the fourth Wednesday in each month. The next meeting will be held Feb. 25.

The *Western Railway Club* will hold regular meetings at its rooms, No. 102 Adams street, Chicago, on the third Wednesday in each month.

ELECTIONS AND APPOINTMENTS.

Alabama Railroad Commission.—The new board of railroad Commissioners, of Alabama, is as follows: W. Tunsdell, of Hale County; Henry R. Shorter of Barbour County; Levi W. Lawler, of Mobile.

Avon, Geneseo & Mt. Morris.—At the annual meeting last week this company elected M. F. Reynolds, President; H. P. Mills, Vice-President; George W. Phelps, Secretary and Treasurer. The road is leased to the New York, Lake Erie & Western.

Belvidere Delaware.—This company, whose road is leased to the Pennsylvania Railroad Co., has elected officers as follows: President, W. Hasell Wilson; directors, John A. Anderson, A. L. Dennis, Hugh B. Ely, F. Wolcott Jackson, Edmund Smith, Henry D. Welsh, John Price Wetherill; Secretary and Treasurer, Hugh B. Ely.

Cape Fear & Yadkin Valley.—Mr. W. M. S. Dunn has accepted the position of General Superintendent of this road. He has been for four years past Engineer and Superintendent of the Virginia Midland road.

Central Missouri.—The directors of this new company are: Edward H. Allen, Thomas B. Bullene, Edward L. Martin, Kansas City, Mo.; Wm. M. Ely, Perry, Mo.; James T. Barber, John H. Garth, Hannibal, Mo.; Henry G. McPike, Henry R. Phinney, Alton, Ill.; George I. Post, Fairhaven, N. Y.; John W. Harrison, J. T. K. Hayward, L. C. Nelson, St. Louis. Mr. J. T. K. Hayward is Acting Chief Engineer.

Cincinnati, New Orleans & Texas Pacific.—At the annual meeting in Cincinnati, Feb 16, the following directors were chosen: Frank S. Bond, Thomas T. Gaff, W. A. Goodman, Alexander McDonald, Isaac T. Martin, Otto Plock, Charles Schiff, Briggs Swift, Augustus Wessel.

East Tennessee, Virginia & Georgia.—Mr. C. A. De Saussure has been appointed Assistant General Passenger Agent, with office in Knoxville, Tenn. He was at one time on the Western & Atlantic, but for three years past has been Chief Clerk to the General Passenger Agent of the Nashville, Chattanooga & St. Louis road.

Missouri Pacific.—Mr. James A. Wilson is appointed Traveling Freight and Passenger Agent in charge of the district including the city of El Paso, the Southern Pacific in New Mexico and Arizona, and the Mexican Central to Chihuahua.

Mississippi & Tennessee.—Mr. James M. Edwards has been appointed General Manager, with office in Memphis,

Tenn. He is also General Manager of the Louisville, New Orleans & Texas.

Nevada Central.—Mr. C. W. Hinchcliffe has been appointed Receiver of this road.

New York Central Sleeping Car Co.—The following circular has been issued by General Superintendent C. D. Flagg:

"By direction of the President the lines operated by this company are to be divided into two divisions, the eastern and western. The territory east of and including Buffalo, will be under the supervision of N. M. Wheeler, Division Superintendent at New York, and west of Buffalo under J. A. Spoor, Division Superintendent at St. Louis. Assistants to the division superintendents will be known as district superintendents and agents, and located as follows:

"Eastern Division.—W. S. Odell, District Superintendent, Buffalo; I. Chamberlain, District Superintendent, Albany; Walter Burns, District Superintendent Boston; C. C. Huges, District Superintendent, New York; Robert Ray, Agent, Rochester; A. C. Stonegrave, Agent, Montreal.

"Western Division.—S. R. Hibbard, District Superintendent, Chicago, N. W.; A. C. Hatch, District Superintendent, Chicago, L. S.; D. Hare, District Superintendent, Chicago, M. C.; W. Dygert, District Superintendent, Detroit; M. Scott, Agent, Toledo; J. L. Noonan, Agent, Cleveland."

New York, Philadelphia & Norfolk.—Mr. A. J. Cassatt has been chosen President in place of Wm. L. Scott, resigned.

Ontario & Quebec.—At the annual meeting, Feb. 3, the following directors were chosen: D. A. Smith, J. J. C. Abbott, Peter Mitchell, E. O. Osler, W. C. Van Horne, Geo. Stephen, D. McIntyre, R. B. Angus, and A. B. Chaffey.

Louisville, Evansville & St. Louis.—The following circular from Geo. F. Evans, Receiver, is dated Louisville, Ky., Feb. 7:

"Mr. C. A. Darlton having resigned the position of Superintendent, to take effect on 14th inst., Mr. R. S. Miner is appointed General Superintendent, with office at New Albany. Mr. Miner will have charge of the Transportation, Mechanical and Roadway departments and of station agents. Appointment to take effect 14th inst."

Pennsylvania Railroad Leased Lines.—In Philadelphia, Feb. 17, the companies named below, whose roads are leased to the Pennsylvania Railroad Co., elected directors as given: *Bedford & Bridgeport.*—President, John P. Green; Directors, R. D. Barclay, W. W. Barclay, J. N. DuBarry, John H. Hartley, H. H. Houston, Wistar Morris, G. B. Roberts, S. L. Russell, N. Parker Shortridge, Edmund Smith, Henry D. Welsh, J. Price Wetherill. *Mifflin & Centre County.*—President, J. N. DuBarry; Directors, Alexander Biddle, G. W. Elder, John P. Green, Samuel MacCay, James H. Mann, Wistar Morris, N. Parker Shortridge, Edmund Smith, Henry D. Welsh, J. Price Wetherill, Wm. H. Wilson.

Pittsburgh & Castle Shannon—At the annual meeting in Pittsburgh, Feb. 17, the following officers were elected: President, John H. Ortman; Directors, Walter Chess, E. Rohrkaste, S. Kaufman, P. F. Schuchman, H. S. McKee, C. Kohlmeyer, F. N. Stucky, S. Gallinger, M. D. Hays, B. J. Stenger.

Western Association of General Passenger & Ticket Agents.—At the meeting in Louisville last week the following officers were elected for the ensuing year: President, C. F. Atmore, Louisville & Nashville; Vice-President, George W. Smith, Lake Erie & Western; Secretary, J. N. Chesbrough, Vandalia Line.

PERSONAL.

—Mr. C. A. Darlton has resigned his position as Superintendent of the Louisville, Evansville & St. Louis road.

—Mr. A. E. Lippincott has resigned his position as General Agent in Cincinnati for the Atchison, Topeka & Santa Fé road.

—Mr. James M. Bailey has resigned his position as General Superintendent of the Pittsburgh and Castle Shannon road, to take effect March 1.

—Mr. Wm. L. Scott has resigned his position as President of the New York, Philadelphia & Norfolk Co. He continues a director of the company.

—Mr. J. F. Tucker has resigned his office as Arbitrator of the Transcontinental Association, on account of the pressure of other business upon his time.

—Mr. E. J. Westlake has resigned his position as Superintendent of dining-car service on the Northern Pacific road, and will engage in business in Chicago.

—Mr. W. M. S. Dunn has resigned his position as Engineer and Superintendent of the Virginia Midland road, to take charge of the Cape Fear & Yadkin Valley road.

—A report, coming from St. Louis, that Commissioner Albert Fink will accept an important position in connection with the Missouri Pacific road after its annual meeting, has been denied by that gentleman, who says there is no foundation for it.

—Mr. E. G. Ghio, Superintendent of the Seaboard & Roanoke Railroad, died at Norfolk, Va., Feb. 18. He began service with the company as an office boy, and worked his way up to the highest position in the gift of the company except that of president. He was also Auditor of the Associated Railways, including the Richmond & Danville, the Atlantic Coast Line and the Seaboard & Roanoke system.

— Mr. Francis A. Drexel, one of the two brothers at the head of the Drexel banking-houses in Philadelphia, New York and Paris, died suddenly, Feb. 15. He was a Philadelphian by birth, born in 1824, and as a boy entered the counting-house of his father, Francis M. Drexel, the founder of what have since grown into the Drexel banks—Drexel & Co., Philadelphia; Drexel, Morgan & Co., New York, and Drexel, Harjes & Co., Paris. Since then the history of these establishments constitutes his biography, except as to his charitable work, which has been carried on by gifts of large sums of money, but in the most unobstrusive ways, and by many manifestations of the kindliest nature to large numbers of persons. Mr. F. A. Drexel was the senior of the two Drexel brothers who give title to the banks bearing their name, but by his desire Mr. Anthony J. Drexel has been the directing head.

—At a special meeting of the board of directors of the Chicago, Milwaukee & St. Paul Railway Co., held in New York Feb. 9, the Vice-President announced the death of Sherburn S. Merrill; whereupon it was

"*Resolved*, That the board has received the intelligence of the death of Sherburn S. Merrill, one of the directors, and the General Manager of the company, with the most profound sorrow.

"*Resolved*, That by his death this company has lost a director and officer of the highest merit and of rare and unsurpassed ability. Associated with this company from an early period in its history, his comprehensive and far-reaching intellect contributed largely to devising and developing its present vast railway system. Faithful in the discharge of his manifold trusts, prompt in action, of the utmost integrity, ever ready to devote his entire energies to the welfare and prosperity of this company—by his death it has lost a wise counsellor and a most efficient and able officer.

"*Resolved*, That by his death the directors personally have lost an associate and friend, who possessed their highest respect and esteem, and who commanded their entire confidence.

"*Resolved*, That the board tenders to the family of the deceased the expression of its heartfelt sympathy in their bereavement, and that a copy of these resolutions be furnished to them."

—Mr. James E. Gowen, one of the most distinguished members of the Philadelphia Bar, died Feb. 16, at his residence at Mount Airy, a suburb of Philadelphia, after an illness of some weeks. He was about 55 years old, and was an elder brother of Franklin B. Gowen, ex-President of the Philadelphia & Reading Railroad, of which James E. Gowen was leading Counsel for many years. He had a very large general practice, and ever since the affairs of the Reading Railroad Co. have been in the courts he had been second only to his brother in the prominence of the part he filled as Counsel for the board. His training was in the law office of George Tucker Campbell, whom he succeeded as Solicitor of the Reading Railroad. He was admitted to the Bar in 1851, and applied himself at once to the energetic pursuit of his calling without ever swerving into the field of politics or finance. His attainments were scholarly, and his energy and application may be inferred from the fact that he died from nervous prostration brought on by overwork. In August, 1876, he was made the nominee of the Democratic party in the city for the Common Pleas bench, but peremptorily declined the honor. Up to within a month he had been laboriously applying himself to the complicated litigation in which the Reading Railroad Co. is involved, and the result was the complete shattering of his system and his death. Mr. Gowen had long resided at Mount Airy, where he was born and where he had always continued to live, his domestic habit being as strong as his love of display was weak. He lived simply and unostentatiously and divided his time between his law office and his home.

TRAFFIC AND EARNINGS.

Coal.

Coal tonnages for the week ending Feb. 7 are reported as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Anthracite	432,591	441,057	D. 8,466	1.9
Eastern bituminous	146,814	125,597	I. 21,217	16.8
Coke	45,315	55,009	D. 9,694	17.6

The anthracite market shows an active demand for the domestic sizes, but is very dull for the larger sizes generally used for steam purposes. The shipments from the mines have been somewhat interfered with by snow and bad weather, and the tide-water stocks, it is said, have been considerably reduced.

The coal tonnage of the Pennsylvania Railroad for the week ending Feb. 7 was:

	Coal.	Coke.	Total.	1884.
Line of road	131,992	44,442	176 434	161,105
From other lines	63,292	873	64,165	54,654
Total	195,284	45,315	240,599	215,759
Year to Feb. 7	976,873	224,711	1,201,584	1,347,127

Increase for the week, 24,840 tons, or 11.5 per cent.; decrease for the year, 145,543 tons, or 10.8 per cent.

Cumberland coal shipments for the week ending Feb. 14 were 34,864 tons; total shipments to Feb. 14 this year, 217,306; last year, 201,332; increase, 15,974 tons, or 7.9 per cent.

The Southwest Virginia Improvement Co. in January mined 39,760 tons of coal from its mines at Pocahontas, Va., and made 6,127 tons of coke. For the year 1884 the total coal mined was 294,898 tons; coke made, 95,945 tons.

Anthracite coal tonnage for January is given as follows by the report of Mr. John H. Jones, the Official Accountant, the statement including the entire production of anthracite coal, excepting that consumed by employes, and for steam and heating purposes about the mines:

	1885.	1884.	Inc. or Dec.	P. c.
Phila. & Reading	601,970	681,782	D. 79 812	11.8
Lehigh Valley	370,745	392,832	D. 52,087	13.1
Del. Lack. & Western	238.419	307,256	D. 68,837	22 4
Del. & Hud. Canal Co.	164,997	199,712	D. 34.715	17.4
Pennsylvania R. R.	208.599	212,324	D. 3,725	1.8
Penn-ylvania Coal Co.	64,005	88,612	D. 24,607	27.4
N. Y., L. E. & W.	23,068	17,054	I. 6,014	35.4
Total	1,641,803	1,899,572	D. 257,769	13.6

The stock of coal on hand at tidewater shipping points, Jan. 31, 1885, was 837,104 tons; on Dec. 31, 1884, 874,681 tons; decrease, 37,577 tons, or 4.3 per cent., during the month.

Cotton.

Cotton movement for the week ending Feb. 13 is reported as follows, in bales:

	1885.	1884.	Inc. or Dec.	P.c.
Interior markets:				
Receipts	36,811	32,351	D. 4,460	13.8
Shipments	52,556	46,757	I. 5,799	12.3
Stock, Feb. 13.	256,045	268,069	D. 12,024	4.5
Seaports:				
Receipts	68.621	105,921	D. 37,300	35.2
Exports	84,745	112,267	D. 27,522	24.6
Stock, Feb. 13	836,602	1,013,548	D. 176,946	17.4

The total shipments from plantations for the cotton year (from Sept. 1) to Feb. 13 are estimated at 5,110,706 bales; the increase, as compared with last year, is 98,404 bales, the decrease from 1882–83 is 463,870 bales, and the increase over 1881–82 is 375,051 bales. The weather during the week was unusually severe, interfering with shipments.

Commissions on Passenger Business.

Arbitrator Hiland, under the Missouri River passenger agreement, has decided against the Chicago & Northwestern company in six cases, in which it is charged that tickets were sold from Chicago to points covered by the agreement, and commissions were paid to the party bringing the purchasers to the office. Traffic Manager Wicker of the Northwestern stated that the tickets were sold at the established tariff rates by the depot ticket agent on orders received by him and in good faith, and that if any commission was paid by the party sending the order to the office it was an outside matter with which the Northwestern road had nothing to do, and which it could not prevent. The Arbitrator, however, decided all the cases again the road, and under the agreement imposed a fine amounting to $440.

Southern Railway & Steamship Association.

The meeting of this Association in Chattanooga last week ended satisfactorily to all parties concerned, contrary to general expectations. At the first day of the session no conclusion was reached, but after the adjournment a private conference was held between the representatives of the Louisville & Nashville, the East Tennessee, the Richmond & Danville and the Cincinnati, New Orleans & Texas Pacific roads, which resulted in an agreement on a basis of settlement. At the second day's meeting of the Association it was voted to re-establish the former pooling agreement and restore rates to the standard prevailing before the recent troubles began. The restoration of rates is to date from Feb. 18, and the adjustment is accepted by all lines in the Association.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1885.	1884.	Inc. or Dec.	P.c
Month of January:				
Ala. Gt. South.	$104,791	$88,313	I. $16,478	18.7
Ches. & Ohio	288,177	280.621	I. 7,556	2.7
Ches., O. & S. W.	113,555	104,694	I. 8,861	8.4
Cin., N. O. & T. P.	201,647	182,809	I. 18,838	10.3
Cin., W. & Balt.	155,654	145,651	I. 10,003	6.9
Cleve., Ak. & C.	31,791	31,562	I. 229	0.7
Denver & R. G. Western	62,615	.....	.....	...
Des M. & Ft. D.	25,211	26,484	D. 1,273	4.9
Eliz., Lex. & B. S.	52,728	47,388	I. 5,340	11.3
Evv. & T. Haute	53,001	44,165	I. 8,836	20.0
Fla. Ry. & N. Co.	96.491	92,198	I. 4,293	4.6
Ft. Worth & D.	22,264	24,896	D. 2,632	10.5
Grand Trunk	1,113,621	1,153,615	D. 39,994	3.5
Gulf, Col & S. F.	92,332	138,414	D. 46,082	33.4
Illinois Central—				
Ill. lines	488,500	488,531	D. 31	....
Southern Div.	396,700	338,041	I. 58,659	17.3
Iowa lines	104,300	131,512	D. 27,212	20.6
Kan. C., Ft. S. & Gulf	213,990	192,887	I. 21,103	10.9
Kan. City, Spr. & Mem.	148.929	71,198	I. 77,731	109.2
Kentucky Cent.	57,117	51,798	I. 5,319	10.2
Marq., H. & O.	15,720	20.080	D. 4,360	21.8
N. O & Nor'east.	54,719	35,738	I. 18,981	52.8
N. Y., Ont. & W.	128,330	121,369	I. 6,961	5.8
St. L., A. & T. H.:				
Main Line	95,042	114.443	D. 19,401	17.0
Belleville Line.	57,119	65,525	D. 8,406	12.8
Texas & St. L.	63,281	69,882	D. 6,601	9.4
Tol., Ann Arbor & N. M.	24,050	15,760	I. 8,290	52.6
Vicksburg & Mer.	42,280	43,323	D. 1.043	2.4
Vicks., S. & P.	29,901	12.483	I. 17,418	124.2
Virginia Midland.	106,004	107,115	D. 1,111	1.0
Wab., St. L. & P.	1,309,564	1,251,083	I. 58,481	4.7
Wisconsin Cent.	102,338	117,895	D. 15,557	13.2
First week in Febuary:				
Canadian Pacific.	$93,000	$53,000	I. $40,000	75.5
Chi. & Alton	134.613	137.988	D. 3,375	2.4
Chi. & East. Ill.	37,170	27,458	I. 9,712	35.3
Chi., Mil. & St. P.	372,000	304,602	I. 67,398	21.1
Chi. & Nor'west.	356,700	336,000	I. 20,700	6.2
Chi., St. P., Min. & O.	82,200	81,400	I. 800	0.9
Cin., I., St. L. & Chi.	44,985	30,671	I. 14,314	46.6
Denver & R. G.	85,085	82,886	I. 2,199	2.6
Long Island	44,038	38,974	I. 5,064	13.0
Louis. & Nash.	268,925	254,645	I. 14,280	5.6
Roch. & Pitts.	18.509	17.504	I. 1,005	5.7
St. L. & San F.	77,200	76,200	I. 1,000	1.3
Wab., St. L. & P.	291,364	205,332	I. 86,032	41.9
Year ending Dec. 31:	1884.	1883.		
Bur., C. R. & No.	$2,796,459	$2,846.772	D. $50,313	1.7
Net earnings	878,690	878,595	I. 95	....
Canadian Pac.	5,750,521	.....	.....	...
Net earnings	1,191,891	.....	.....	...
Central Pacific.	22,166,107	24,744,420	D. 2,578,313	10 4
Net earnings	6,470,710	9.173,821	D 2,703,111	29.5
Ches. & Ohio	3,538,606	3,906,793	D. 368,187	9.4
Net earnings	1,075,885	1,353,299	D. 277,414	20.5
Ches., O. & S. W.	1,374 645	1,322,455	I. 52,190	3.9
Net earnings	339,951	308,922	I. 30,029	9.7
Chi., Bur. & Q.	25,483.671	26,110,369	D. 626,698	2.5
Net earnings	12,415,103	12,329,739	D. 914,636	6.8
Des M. & Ft. D.	354,029	341,924	I. 12,095	3.5
Net earnings	101,660	94,798	I. 6,862	7.2
Eliz., Lex. & B. S.	762,627	713,103	I. 49,524	6.9
Net earnings	258,052	214,327	I. 43,725	20.4
Ft. Worth & D.	459,647	388,123	I. 71,524	18.4
Net earnings	216,361	.....	.....	...
Kentucky Cent.	922,107	838,975	I. 83,132	9.9
Net earnings	318,485	353,744	D. 35,259	10.0
L. Rock & Ft. S.	589,071	557,839	I. 31,232	5.6
Net earnings	245,582	225,296	I. 20,286	9.0
L. R., M. R. & T.	368,271	416,582	D. 48,311	11.6
Net earnings	25,523	98,177	D. 72,654	74.1
Rome, Wat. & Og.	1,727,683	1,673,430	I. 54,253	3.2
Net earnings	612,017	421,044	I. 190,973	45.4
Utah Central	1,038,838	1,174,736	D. 135,798	11.5
Net earnings	478,733	604,450	D. 125,717	20.8
Month of December:				
Central Pacific.	$1,667.562	$1,868,458	D. $200,696	10.7
Net earnings	411,077	589,269	D. 178.192	30 2
Chi., Bur. & Q.	2,060,357	2,170,918	D. 110,561	5.1
Net earnings	1,048,018	1,171,790	D. 123.772	10.6
Cin., Ind., St. L. & Chi.	203,093	177,395	I. 25,698	14.5
Net earnings	76,201	40,075	I. 36,126	90.2
L. Rock & Ft. S.	76,512	67,524	I. 8,988	13.2
Lt. Rock, M. R. & Tex	54,822	56,229	D. 1,407	2.5
Rome, W. & Og.	138,035	131,929	I. 6,106	4.7
Net earnings	52,950	52.682	I. 268	0.5

Weekly earnings are usually estimated in part, and are subject to correction by later statements.

Commercial Tickets.

At a meeting of the committee of the Merchants' Association, headed by Mr. Selz as Chairman, and the general ticket agents of the Chicago, Burlington & Quincy, the Chicago, Milwaukee & St. Paul, and the Chicago & Northwestern Railways, held at the office of the Chicago freight bureau yesterday in relation to the 1,000-mile permit ticket issued by these roads, it was agreed to appoint one representative of the merchants' committee and one of the railroads to examine all the tickets presented and adopt such good features as are found most practicable into the new form of ticket, to be submitted to the joint committee at a future meeting. Mr. W. F. Bemis, of Sprague, Warner & Co., was named to represent the Merchants' Association. The railroads did not name a man, but he will probably be some employé of one of the roads, thoroughly posted as to details. It is understood that the joint committee has virtually agreed to substitute a ticket that the traveling men can carry with them in place of the present permit, and still retain some of the good features of the permit. It is also understood that the ticket shall be issued only to the houses and rebates paid to them.—*Chicago Inter-Ocean, Feb.* 15.

Colorado-Utah Association.

Commissioner George H. Daniels, of the Colorado-Utah Association, has submitted the following letter to Mr. R. W. Woodbury, President of the Denver Chamber of Commerce and Board of Trade:

"I am instructed by the managers of the lines, members of the Colorado Railway Association, to say to you that they will be glad to use every means within their power consistent with a broad commercial policy to encourage manufactures in Colorado, and to foster and build up her home institutions; and to this end they will be pleased to meet at all times, through their representatives, committees of your association or others, for the purpose of discussing means for the advancement of such interests, believing, as they do, that the interests of the people of the state of Colorado and of the railroads members of this association, are largely identical, and that whatever legitimately advances your interests must advance the interests of these railways. This association invites, through your Chamber of Commerce, the attention of

the manufacturers of the United States to the advantages of the Rocky Mountain country for the establishment of industrial enterprises."

RAILROAD LAW.

Trespassers on a Locomotive.

In the case of Carter against the Louisville, New Albany & Chicago Co., the Indiana Supreme Court holds as follows:

The servants of a railroad company to whom the management and control of an engine has been intrusted, whether used for switching or other purposes, have, while using and controlling it, implied authority to remove from it any trespasser who may get on it or attempt to occupy and control it. The fact that switching engines are used for local purposes, and not for the purpose of receiving and discharging passengers, does not change the right of the employés to remove from the switching engine persons wrongfully on it whether their presence may or may not interfere with the use of the engine and the business to be transacted.

Ejecting a Passenger—Damages.

In the case of Homer against the Georgia Railroad Co. the Georgia Supreme Court holds as follows:

Except in cases where the entire injury is to the peace, happiness or feelings of the plaintiff, worldly circumstances should not be admitted or weighed in the ascertainment of damages.

Where a passenger on a railroad train who had delivered his ticket to the conductor was subsequently ejected by the latter, who took him by the arm, led him to the platform, and he thereupon got off, although this was done kindly and he did not resist so as to require violence, yet the jury might find exemplary damages. The inconvenience, insult in the presence of fellow passengers and wounded feelings of the person ejected could be considered by the jury.

Extraordinary diligence is the measure of care which conductors must exercise toward passengers.

In case of the ejection from a railroad train of a passenger who had previously delivered up his ticket, and who sues for damages on account of such ejection, the presumption is against the company; and it devolves on it to show that the conductor who put the passenger off acted rightly and under authority of law, and thus to lift the burden cast upon it by law.

The illegal ejection of a passenger entitled by contract to be carried over a railway is itself an act for which damages are recoverable. The measure is for the jury.

While the good faith of a conductor who improperly ejected a passenger would not defeat the right to recover damages therefor, yet it might be considered in fixing the amount of such damages, and bad faith on the part of the conductor might be considered to increase the damages.

Measure of Damages for Killing a Person.

In the case of Pittman against the Georgia Railroad Co., the Georgia Supreme Court holds as follows:

Whether a person's capacity to earn money and labor successfully would be diminished from old age, and how much such diminution would be, depends a good deal upon the character of the labor and the expectation of life of the person, and this question was fairly submitted by the Court to the jury.

The act of 1878, allowing the wife to recover the full value of her husband's life in case of his homicide, is not unconstitutional or invalid; and in construing it the judge gave the full measure of its rights to the defendant below in having the husband's support, while living, deducted from the recovery.

There was no error in charging the jury that "if you find it your duty to find for the plaintiff, you will look to the evidence and determine from that how much you will find. You will, in arriving at a conclusion, look to the evidence as to the age of plaintiff's husband, the probable length of his life, the amount that he earns or would probably earn during his life, and the state of his health.

The act of 1878 (Code, § 2972) clearly gives to the widow the right to recover the full value of the life of her husband for whose homicide she sues; and the jury are to determine the present value of that life.

There was sufficient evidence to support the verdict; nor was a verdict of $5,500 in favor of a widow who sued for the homicide of her husband excessive, where it appeared that the husband had an expectancy of over 20 years of life and an annual income of near $1,000, deductions having been made on account of contributory negligence, the effect of advancing age, and the support of the husband himself, under the charge of the court.

OLD AND NEW ROADS.

Americus, Preston & Lumpkin.—The work of grading this road from Americus, Ga., westward to Preston, in Webster County, 20 miles, is very nearly completed, and the bridging will be finished by the close of the present month. The contract for laying track has been let, and that work will be begun very shortly. As soon as this section is finished work will be begun on the extension from Preston, westward about 19 miles to Lumpkin.

Belvidere Delaware.—At a meeting held in Camden, N. J., Feb. 16, the stockholders of this company and of the Flemington Railroad Co. voted to authorize a consolidation of the two companies. The capital stock of the consolidated company is fixed at $1,150,000, which is the amount of the combined capital of the two companies. The consolidated company will retain the name of the Belvidere Delaware Railroad Co. The Flemington road has always been operated as a branch of the other line. Both roads are leased to the Pennsylvania Railroad Co.

Boston & Albany.—This company's statement to the New York Railroad Commission for the quarter ending Dec. 31 is as follows:

	1884.	1885.	Inc. or Dec.	P. c.
Earnings	$2,015,259	$2,142,151	D. $126,892	5.9
Expenses	1,286,221	1,452,876	D. 166,655	11.5
Net earnings	$729,038	$689,275	I. $39,763	5.7
Interest, rentals, etc.	666,041	634,816	I. 31,225	4.9
Surplus	$62,997	$54,459	I. $8,538	15.7

The working expenses were 63.8 per cent. of gross earnings this year, against 67.8 per cent. last year, not including taxes.

This company has signified its willingness to co-operate in the execution of the plan of tunneling Franklin street in Worcester. The Providence and the Norwich roads have been asked to co-operate, but have not yet been heard from. The estimate of the city's share of the expense is $28,400.

Buffalo, New York & Philadelphia.—It is said that the stockholders have been very slow in responding to the appeals made to them to subscribe for the unissued general mortgage bonds. The time for subscribing will expire March 1, and unless there is a general response next week, it is thought that only a small part of the bonds will be taken.

Calhoun, Sac City & Dakota.—This company has been incorporated to build a railroad from Rockwell, Ia., northwest to the Dakota line. The capital stock is fixed at $1,500,000.

California Southern.—The Boston *Advertiser* of Feb. 18 says: "It is understood that Messrs. Kidder, Peabody & Co. are advancing the money for building the extension of the California Southern to connect with the Atlantic & Pacific, taking as collateral 6 per cent. bonds of the company. It is supposed that from $1,500,000 to $2,000,000 will be required during the year, which will be paid as the bonds are sold. The road is doing well. It earned operating expenses, less taxes, during last year, notwithstanding its impairment by freshets and its lack of connection. Its earnings for the first month of this year were $2,100 more than those in January, 1884. There is a large influx of immigration to Southern California, some of which will permanently increase the local traffic of this road. The through business will depend on circumstances, but there is no reason to suppose it will be very large, for some years at least, unless the conduct of the Southern Pacific should compel the Atchison to make San Diego instead of San Francisco its main Pacific port."

Canada Atlantic.—This company has completed its extension from Ottawa, Can., to Lacolle, on the Grand Trunk road, and having secured the use of the Grand Trunk tracks from Lacolle to Rouse's Point, it will shortly open its new line from Ottawa to Rouse's Point. The road is now completed from Coteau to Lacolle, and in connection with the Grand Trunk makes a new line from Montreal to Rouse's Point.

Canadian Pacific.—The report of the Minister of Railways to the Canadian Parliament shows that the length of the Pacific Railway proper is 2,895 miles, divided as follows:

	Miles.
Montreal to Callander	345
Callander to Port Arthur	657
Port Arthur to Red River	428
Red River to Savona's Ferry	1,252
Savona's Ferry to Port Moody	213

Upon the first of these sections the work is complete and the road in operation; north of Lake Superior the grading is completed, and only about 200 miles of track remain to be laid; on the two next sections, from Port Arthur to Savona's Ferry, embracing a distance of 1,680 miles, the road is in operation for some 1,480 miles, and from Savona's Ferry to Port Moody only three miles are unfinished. So that not more than 400 miles out of a total of 2,895 await the rails, and only 195 miles require to be graded to enable the line to be opened and operated throughout. Within the last four years 1,800 miles have been built. There are now no less than 11,000 men at work on the unfinished sections. The total length of the company's system is 3,327 miles, of which 2,895 miles is main line from Montreal to Port Moody, and 432 miles branch lines. Out of the money subsidy of $25,000,000 there has been paid to the company up to Dec. 31, 1884, $19,773,037, leaving a balance of $5,226,963 to be paid, while of the loan of $22,500,000 made last session, $17,970,730 has been paid, and $4,529,270 is yet to be earned.

Carolina Central.—People along the line are moving to secure an extension of this road from its present terminus at Rutherfordton, N. C., to Asheville, and it is proposed that the counties of Rutherford and Buncombe should each subscribe $100,000 in aid of the extension. The grading from Rutherfordton to Shelby, 24 miles, was completed before the war, but no tracks have been laid upon it. The charter of the road authorizes its extension to the Tennessee line.

Central Iowa.—It is stated that the abutments and superstructure of this company's bridge over the Mississippi at Keithsburg will cost about $300,000. Under the contract they are to be paid for either in cash or in the bonds of the bridge company, guaranteed by the Central Iowa Co., and to be taken at 85 cents on the dollar. About $80,000 have already been expended upon the approaches to the bridge. The issue of bonds is limited to $600,000. These bonds are issued by the bridge company, which is an independent organization, but the Central Iowa Co. owns all its stock.

Central Missouri.—This company has been organized to build a railroad from East St. Louis, Ill., to Alton, and thence westward across Missouri to Kansas City. It is also proposed to build branches from a point on the main line in Boone County, Mo., to Hannibal and to Jefferson City. The project includes the building of bridges across the Mississippi, at Alton, and across the Missouri, at Arrow Rock. The total length of road proposed is 375 miles in Missouri and 20 miles in Illinois. It is claimed for the proposed line that it will have better grades than any of the existing lines between St. Louis and Kansas City, and that it will touch a good deal of country now remote from the railroad.

Chicago, Burlington & Quincy.—The company makes the following statement for December and the year ending Dec. 31:

	December.		Year.	
	1884.	1883.	1884.	1883.
Earnings	$2,060,357	$2,170,918	$25,483,671	$26,110,369
Expenses	1,012,339	999,128	13,068,568	12,780,630
Net earnings	$1,048,018	$1,171,790	$12,415,103	$13,329,739
P. c. of exps.	49.1	46.0	51.3	48.9

The gross earnings for the year show a decrease of $626,698, or 2½ per cent., and the expenses an increase of $287,938, or 2 per cent., the result being a decrease of $914,636, or 7 per cent., in net earnings.

Cincinnati, Indianapolis, St. Louis & Chicago.—This company makes the following statement of income account for the six months ending Dec. 31:

	1884.	1883.	Inc. or Dec.	P. c.
Gross earn. and miscellaneous credits	$1,374,167	$1,359,415	I. $14,752	1.1
Expenses, taxes, interest, etc	1,161,993	1,188,172	D. 26,179	2.2
Surplus	$212,174	$171,243	I. $40,931	24.0

For the past year the surplus has been applied to payment of the floating debt and improvements of the road.

Cincinnati New Orleans & Texas Pacific.—At the annual meeting in Cincinnati, Feb. 16, a resolution was adopted authorizing the board of directors, if they deem best, to terminate the lease of the Cincinnati Southern road and surrender it to the lessor, upon the ground of the entire failure of the lessor to perform its covenants and obligations thereunder, whereby it is rendered impossible for the lessee to successfully and profitably operate the road.

Mr. Kittredge supported this resolution by a speech, in which he characterized the Trustees as illiberal lessors. He said they had been an obstruction from the first to the lessees in making the road profitable under the lease. They turned the road over to the leasing company in a much worse condition than was known at the time, and they had failed to live up to their agreement to furnish the needed terminal facilities. As a result, there had been no dividends, but a heavy loss. And now the company was called upon to expend $100,000 to narrow the gauge, the consent to do which had with difficulty been obtained. Besides this, there would be required $300,000 for betterments. The lessors, he declared, had opened the way for the company legally to surrender the lease. If done at present, the stockholders could save 50 per cent. of their original outlay, but if they went any further, such were the expenditures immediately required that it would be too late to escape from the lease without losing their entire investments. President Scott said that unless the road was relieved by the providing of proper terminals and the changing of the gauge to standard, the stockholders might as well make lamp-lighters of their certificates.

Cincinnati Northwestern.—Preparations are being made to change the gauge of this Cincinnati suburban line from 3 ft. to standard gauge. The road, which was formerly known as the College Hill road, and which has been in very poor condition, is to be practically rebuilt. It is understood that as soon as the gauge is changed the trains will run into Cincinnati on the Cincinnati, Hamilton & Dayton track.

Columbus & Rome.—This road is now completed to Greenville, in Meriwether County, Ga., 8 miles northward from the late terminus at Stinson and 49 miles from Columbus. The first train reached Greenville Feb. 9, giving that town railroad communication for the first time.

Delaware, Lackawanna & Western.—This company makes the following statement for its leased lines in the state of New York for the quarter ending Dec. 31:

	1884.	1883.	Inc. or Dec.	P. c.
Earnings	$1,375,001	$1,509,276	D. $134,275	8.9
Expenses	686,508	832,950	D. 146,442	17.6
Net earnings	$688,493	$676,326	I. $12,167	1 8
Deductions from income	577,870	530,542	I. 47,328	8.9
Surplus	$110,623	$145,784	D. $35,161	24.1

The working expenses (not including taxes) were 49.9 per cent. of gross earning in 1884, against 55.2 per cent. in 1883.

Fairmont, Morgantown & Pittsburgh.—The contract for the grading of this road from Morgantown, W. Va., to Fairmont, 17 miles, has been let to James O'Conner, of Pittsburgh, Pa., who is to begin work at once.

Fort Worth & Denver City.—Work on the grading of the extension of this road is progressing well, and it is thought that the whole line will be ready for the rails about the middle of April. Some of the rails have already been received, and ties and other supplies are on the road. The extension will run from the present terminus at Wichita Falls, Tex., through Wilberger into Hardeman County, about 40 miles. The terminus, which is not yet definitely located, will be called Harrold; and at that point extensive stock yards will be built, and other yards will also be built on the line in Wilberger County. The heaviest work on the extension is the bridge over the Big Wichita, the approaches to which will require a heavy cut. This work is well advanced, and will probably be done about March 1, when tracklaying will be begun.

Gulf, Colorado & Santa Fe.—This company's agent has submitted a proposition to the people of Fort Worth, Tex., and other towns along the line. He offers to build a road from Fort Worth, through Gainesville, to a point on the Red River during the present year, provided the towns will give the right of way. This extension will be the commencement of the company's line across the Indian Territory to Kansas, the right to build which was obtained from Congress a year ago.

Hancock & Calumet—This company has been organized to build a railroad from Red Jacket to Torch Lake in the Upper Peninsula of Michigan. The distance is about 18 miles, and the road is intended to accommodate the copper mines of the Osceola and the Tamarack companies.

Houston & Texas Central.—In the United States Circuit Court in Galveston, Tex., Feb. 14, two bills in equity against this company were filed by Messrs. Easton and Rintoul, the trustees of the first-mortgage bonds on the main line and of the first-mortgage bonds on the Austin Division. The suits are separate on each mortgage. The bills allege default of the company in the payment of the annual sinking fund, arising from misapplication of its earnings to the payment of subsequent indebtedness; also that the company has made sales of a large quantity of mortgaged lands without the knowledge or consent of the trustees, and has not paid the proceeds to the sinking fund. The object of the suit is to compel the company to make good the sinking funds for each of these first mortgages, and restrain any diversion of the funds for the payment of the same annually, and to reach the proceeds of lands which have been sold. The bills also allege default in the payment of interest on the first-mortgage bonds due Jan. 1, although the 60 days within which the payment may still be made has not yet expired.

It is stated that the trustees have no present intention of applying for a receivership, or of taking any further action than that indicated by the suits begun.

Little Rock & Fort Smith.—For December and the year ending Dec. 31 the statement of this company is as follows:

	December.		Year.	
	1884.	1883.	1884.	1883.
Earnings	$76,512	$67,524	$589,071	$557,839
Expenses	36,614	30,647	343,489	332,543
Net earnings	$39,898	$36,877	$245,582	$225,296
Per cent. of expenses.	47.8	45.4	58.3	59.3

The gross earnings for the year show an increase of $31,232, or 5.6 per cent., and the expenses an increase of $10,946, or 3.3 per cent., the result being an increase of $20,286, or 9 per cent., in net earnings.

Little Rock, Mississippi River & Texas.—This company makes the following statement for December and the year ending Dec. 31:

	December.		Year.	
	1884.	1883.	1884.	1873.
Earnings	$54 822	$56,229	$368,270	$416,382
Expenses	38,634	42,528	342,748	318,204
Net earnings	$16,188	$13,701	$25,522	$98,178
Per cent. of expenses.	70.5	75.9	93.1	76.5

For the year the gross earnings decreased $48,112, or 11.6 per cent., while the expenses increased $24,544, or 7.6 per cent., the result being a decrease of $72,656, or 74.1 per cent., in net earnings. The expenses include about $100,000 for improvements of road.

Louisville, New Orleans & Texas.—The Arkansas City Branch of this road, to which reference has heretofore been made, leaves the main line at Leland, Miss., and runs to the Mississippi River at Shelby's, opposite Arkansas City. This branch is 22.94 miles long, and 7 miles of track were laid last year.

The Greenville Branch leaves the Arkansas City Branch at Wilszinski, 7.2 miles from Leland, and runs to a terminus at the south end of Lake Washington at the Issaquena County line. This branch is 33½ miles long, and 11½ miles of it were completed last year.

A dispatch from Vicksburg, Miss., Feb. 16, says: "The hostilities in the case of Eugene Martin and others against the Louisville, New Orleans & Texas Co., R. T. Wilson, and Collis P. Huntington, have been reopened. It was supposed that an agreement or compromise was reached in this case last August. To-day Alfred B. Pittman, solicitor of the complainants, filed an amendment and and supplemented bill,

seeking to cancel the first-mortgage bonds of the road, amounting to $20,500,000, as having been issued in violation of the compromise and of the pending injunction. The bill claims that there was an excessive issue and that the mortgage covers 800,000 acres of land on the line of the road on which the income bond mortgage was to be the first incumbrance, and makes other objections.

"The objections to the income bond mortgage, among numerous others, are first, that it constitutes a second instead of a first incumbrance on the land; second, that there is a reservation incompatible with the grant which renders the mortgage of doubtful validity; third, that it provides for the payment out of the income of the railroad of interest and sinking funds for any other bonds which may be at any time outstanding, not limiting such payments to the first mortgage bonds. Exceptions are also taken to the trustees, who are said to be mere clerks of Huntington and Wilson, and not suitable trustees for a mortgage to secure $10,000,000 of bonds, having 50 years to run. A petition was also filed to proceed against R. T. Wilson, Collis P. Huntington, William M. Johnson, and the corporation for contempt in violating the injunction. This petition was granted on an inspection of the papers and citations issued and returnable on the first Monday in May."

Manhattan.—This company makes the following statement of the result of the operations of the elevated roads in New York for the quarter ending Dec. 31:

	1884.	1883.	Inc. or Dec.	P. c
Earnings	$1,750,842	$1,743,829	I. $7,013	0.4
Expenses	963,580	995,091	D. 91,511	9.2
Net earnings	$847,262	$748,738	I. $98,524	13.2
Other income	19,280	21,374	D. 2,094	9.9
Total	$866,542	$770,112	I. $96,430	12.5
Interest, etc	382,279	370,300	I. 11,976	3.2
Surplus	$484,266	$399,812	I. $84,454	21.1

The earnings for the quarter in 1884 were $54,150 gross and $26,204 net per mile of road. The balance sheet shows a debit balance of $886,186 to profit and loss, which was caused by the payment of $1,471,720 to the city for arrears of taxes.

Mexican Central.—A dispatch from Tampico, Mex., says that the Tampico Branch of this road is now completed to a point 140 kilometers from Tampico, this section covering the most expensive part of the road. There remains 650 kilometers to be built to complete the road, but the average cost will be very much less than the part already built. Regular trains are run on the road as far as completed.

Mexican Railroad Notes.—The following notes are from the *Mexican Financier* of Feb. 7:

The report comes from Laredo that a movement is on foot to push the Sunset Line into Mexico, known on this side of the river as the Mexican International, to a completion beyond the present terminus at Monclova, through the coal fields at the head of the Sabinas and Salada rivers, on and through the city of Saltillo, to a connection with the Mexican Central at San Luis Potosi.

A great advantage to importers by the overland route is offered by the establishment of a forwarding agency at Paso del Norte directly under the management of the railroad company. The object is to secure the quickest despatch of goods possible through the custom house and at a merely nominal cost to the consignees. For some time past, shippers have been more or less at the mercy of the different commission merchants and in many cases expenses have been piled on, under one pretext or another, so that the costs of forwarding almost rivalled those at Vera Cruz. Such abuses will now be entirely done away with, as the railroad company proposes to do the work at actual cost, charging shippers only what is absolutely necessary to cover office expenses and clerk hire. As it is an experiment and the expense cannot be yet determined, the charge at first will be about 1½ per cent. of the value of the invoice, but after the agency has been put into running order this charge will be reduced to the minimum point, as it is not intended to furnish any revenue to the company except indirectly, by offering merchants every possible inducement to patronize the railroad route in preference to sea transportation. Mr. H. Howard Benedict, who has been in the service of the company from the start, as secretary of General Managers Fink and Robinson, is appointed customs agent, and has full control of the forwarding agency. United States shippers can now consign their goods for any point on the Mexican Central to him, and the railroad company will give bond for the payment of duties, if the goods are dispatched at interior custom houses, or pay the duties at Paso del Norte, as the case may be. Of course the company requires for its protection either a deposit of cash or a bond if the consignee is a well-known house.

Mississippi & Tennessee.—This company is now fully controlled by the Louisville, New Orleans and Texas; and while its organization remains distinct, it is operated by the same officers.

Missouri Pacific.—A dispatch from Jefferson City, Mo., Feb. 16, says: "In the Supreme Court this morning Attorney General Boone filed several informations against Jay Gould and others, who are officials in the Missouri Pacific, the Wabash, St. Louis & Pacific and the St. Louis, Iron Mountain & Southern railroads, in violation of a provision of the state constitution which prohibits the officers of one railroad corporation from holding office in another or owning or controlling parallel or competing railroads, and which also prohibits officers of express companies from holding offices in the railroads over which their express lines run. The proceeding is in the nature of a *quo warranto* to compel these officials to show cause why they should not vacate offices they hold in violation of the Constitution."

Nevada Central.—On application of the bondholders a receiver has been appointed for this road. It extends from Battle Mountain, Nev., on the Central Pacific, to Austin, 93 miles. It is controlled by the Union Pacific Co., but a year ago that company declined to make any further advances for payment of interest, as it had never earned enough to pay the coupons. The funded debt consists of $750,000 first mortgage 6 per cent. bonds and $250,000 second mortgage income bonds.

New York, Lake Erie & Western.—The quarterly statement for the three months ending Dec. 31 was filed with the State Railroad Commissioners at Albany, Feb. 18. As compared with the figures for the corresponding quarter in 1883 the showing is as follows:

	1884.	1883.	Inc. or Dec.
Gross earnings	$5,141,580	$6,415,696	D. $1,274,116
Operating expenses	3,593,565	4,517,391	D 923,826
Net earnings	$1,548,015	$1,898,305	D. $350,290
Income from other sources	308,047	188,127	I. 119,920
Gross income	$1,856,062	$2,086,432	D. $230,370
Interests, rentals, and taxes	1,724 188	1,942,152	D. 217,946
Net income	$131,874	$144,280	D. 212,409

The decrease in the operating expenses is stated at 2.85 per cent., and the total operating expenses at 64 per cent. of the earnings.

New York Central & Hudson River.—In the Superior Court in New York, Feb. 16, arguments were heard in the Newton suit to enjoin this company from paying the quarterly dividend last declared. The Court reserved its decision.

Northern Central.—This company gives notice that the $1,490,000 second mortgage 6s, due July 1, will be paid at maturity. Holders of the above bonds have the privilege, after April 1, 1885, of receiving therefor, at par, a new series of bonds secured by the consolidated general mortgage of 1874, maturing in 70 years from April 1, 1885, bearing interest at 4½ per cent. per annum in gold. Upon surrender of the old bonds at the Fidelity Trust Co., in Philadelphia, or at the Safe Deposit & Trust Co., in Baltimore, the new bonds will be issued in corresponding amounts, provided the holders surrender them by May 15 next, at which time the interest maturing July 1 on the bonds surrendered will be paid in full.

Norwich & Worcester.—At a special meeting in Worcester, Feb. 18, a vote was passed to approve the action of the directors in agreeing to reduce the rental of the road to the New York & New England Co. from 10 to 8 per cent. This action was unaminous by all the stock voted on.

Ogdensburg & Lake Champlain.—The Boston *Advertiser* says: "The recent foreclosure sale of the three large propellers at Detroit, which had been running in connection with the Ogdensburg & Lake Champlain road, brings to an end the negotiations that were pending for their purchase and the construction of three more. They were bid in by the company holding a lien upon them, and will, quite likely, be in the market for some time. The contract was onerous upon the Ogdensburg road, and was repudiated by the new management as *ultra vires*. President Mills says that six boats are necessary to a proper dispatch of freight, and he does not wish any further arrangement with a three-boat line.

"The temporary injunction granted on petition of Boston holders of income bonds, restraining the company from paying interest under its guaranty of the Lamoille Valley Extension bonds, remains in force. The amount of these bonds outstanding is $350,000, and half of them are owned by the New York Central. The Extension road was built to provide a connection between this road and the St. Johnsbury & Lake Champlain. It includes a pile bridge across Lake Champlain, and the entire extension is closely parallel with the Central Vermont between Rouse's Point and Swanton. The present management prefers to use the Central Vermont track. By means of the Blue Line considerable traffic goes over this and the St. Johnsbury road, connecting at Swanton. Much of it is bound for Portland and other Eastern points."

Pennsylvania.—It is said that a survey has been made for a branch from the new Reading line at Berkley, Pa., to Farmington, on the Catasauqua & Fogelsville road. It is believed that this route for a connection with the Lehigh Valley road will be preferred to the line heretofore surveyed to Allentown, as it will require the construction of much less road, and the use of the Catasauqua & Fogelsville tracks can readily be obtained.

Philadelphia & Chester County.—The bondholders of this company have applied to the court for an order to direct the trustee to foreclose the mortgage. The road was intended to run from Philadelphia to West Chester, and was partly opened, but no track has ever been laid.

Philadelphia & Reading.—At the meeting of general mortgage bondholders in Philadelphia last week quite a number were present. Mr. Bartol, who called the meeting, and others made speeches, and resolutions were adopted to the effect that the plan of reorganization proposed by the directors of the company favored unduly the holders of the junior securities at the expense of the general mortgage bondholders. It was resolved to appoint a committee to prepare a new plan and report to an adjourned meeting. This committee was authorized to employ counsel and to watch the proceedings and the payments made by the Receivers. The committee appointed consists of John B. Garrett, E. Dunbar Lockwood, John W. Moffly, John A. Wright and Henry W. Bartol.

The report of the Special Master to the Court on the payment of rentals recommends that the Receivers should be allowed to continue the payment of rentals in all cases where the leased property earned the amount. After the interest on debts prior to the general mortgage, he recommends that the Receivers shall be authorized to pay it; and he also recommends that they be authorized to pay interest on floating debt in those cases where such payments are required to protect the interest of the bondholders by preventing the sale of securities pledged as collateral. He is satisfied that the Receivers should be authorized to continue payments to the sinking fund of the coal land mortgages in cases where the value of the land exceeds that of the mortgage.

In Philadelphia, Feb. 16, the Court approved the Master's report recommending that the Receivers be permitted to make payments under the car trust loan, now due. The payments due are $54,000, as semi-annual interest at 3 per cent. on $1,800,000, the sum of $200,000 being the annual installment of principal due under the terms of the loan, and $20,000 as compensation to the Union Trust Co., Trustee. The Union Trust Co. at once received a check for the entire amount of matured principal and interest, and soon after the payment on the bonds was begun.

Pittsburgh & Lake Erie.—In the suit of B. J. Mc Grann, contractor, to recover $600,000 for extra work alleged to have been done in building this road, the court has granted a non-suit, on the ground that Mr. McGrann has failed to show that there had been any fraud on the part of the company in the final settlement.

Raleigh & Augusta Air Line.—This company is about to build a line from Moncure, N. C., to Pittsboro, 10 miles. The road will be graded by the people along the line, but the Raleigh & Augusta company will furnish the rails and will own and operate the road.

Reading & Pottsville.—A contract for the heaviest work on this new line, a cut 2,000 ft. long and 60 ft. deep at the deepest point, has been let to Drake & Stratton, of New York, who were the lowest bidders, and who will begin work as soon as the weather permits. The grading of two other sections has been let to E. J. Gaynor, of Pottsville. This completes the letting of the work near Pottsville. The remaining section will be let before long, and at such date as will enable the contractors to finish them at the same time with the heavy cut near Pottsville.

Rochester & Pittsburgh.—The statement for the quarter ending Dec. 31, the first quarter of the fiscal year, is as follows:

	1884.	1883.	Inc. or Dec.	P. c.
Earnings	$311,947	$252,615	I. $59,332	23.5
Expenses	202,633	197,048	I. 5,585	2.8
Net earnings	$109,314	$55,567	I. $53,747	96.7
Interest, rents, etc	164,453	146,504	I. 17,949	12.2
Deficit	$55,139	$90,937	D. $35,798	39.3

Surveys have been made for a branch from Rasselas, Pa., into a large tract of timber land, recently purchased by parties who intend to make heavy shipments of lumber as soon as the necessary preparations can be completed.

Rome, Watertown & Ogdensburg.—This company's statement for the quarter ending Dec. 31, the first quarter of the fiscal year, is as follows:

	1884.	1883.	Inc or Dec.	P c.
Earnings	$469,691	$456,276	I. $13,415	2.9
Expenses	269,996	269,891	I. 105	0.4
Net earnings	$199,695	$186.385	I. $13,310	9.1
Other income	7,316	8,405	D. 1,189	14.0
Total	$207,011	$194,890	I. $12,121	6.2
Inte'est, rent and taxes	168,461			
Surplus	$38,550			

The expenses this year were 62 per cent. of the gross earnings for the quarter.

Sequatchie Valley.—A movement is on foot for securing the construction of a railroad through the Sequatchie Valley, in Tennessee. Several meetings have been held, and it has been decided to offer right of way, station grounds and exemption from taxes for 20 years, to the Nashville, Chattanooga & St. Louis Co., provided it will build a branch of its road on the line proposed. Some cash subscriptions are also promised in aid of the road.

Southern Pacific.—The following statement has been published, covering all the lines of this company in California, Arizona and New Mexico for the year ending Dec. 31:

	1884.	1883.	Decrease.	P. c.
Earnings	$7,170,000	$8,398 000	$1,228,000	14.6
Expenses	4,060,000	4,139,350	79,350	1.9
Net earnings	$3,110.000	$4,258,650	$1,148,650	27.0
Interest	2,433.300	2,433,300		
Surplus	$676,700	$1,825,350	$1,148,650	62 9

These figures do not include the receipts from land sales of the Southern Pacific of California, which are being used to redeem the first-mortgage bonds, and which amounted to about $1,000,000 during the year.

Storm.—The storm of Feb. 16 and 17 adds another to the list which will make the present month one to be long remembered by railroad men. This storm extended from Chicago eastward to the Atlantic coast, taking the form of snow to the westward and in New York, and of rain along the coast. All the lines eastward from Chicago were blocked, and in Northern New York and New England they suffered severely, train movement being suspended for nearly two days. In New Jersey and Pennsylvania much damage was done by the heavy rain and by the severe cold which followed it closely, freezing up the swollen streams and making it very difficult to repair the damage done.

Toledo, Cincinnati & St. Louis.—A recent report of the Receiver says that this road last year failed to earn its working expenses in any month. The road was very poorly built in the first place and is now in very bad condition, with no means on hand to improve it.

Troy & Greenfield.—Two bills have been presented for the consideration of the Railroad Committee of the Massachusetts Legislature, in relation to the disposal to be made of this road. One fixes $5,000,000 as a minimum price at which the Governor and Council shall be authorized to sell the road, and provides for its sale to a consolidated company, to be made up of the other roads in the Tunnel Line. This bill provides for an absolute sale of the road, and for its consolidation with the Fitchburg and the Vermont & Massachusetts roads. The other bill provides for the organization of a company to be known as the Boston, Hoosac Tunnel & Northwestern, which may acquire the Fitchburg, the Vermont & Massachusetts and other roads by consolidation or purchase, and must also acquire the Troy & Greenfield road by the issue of stock to the state. This bill provides that the state shall retain a voice in the management by its interest in stock and by the appointment of a number of the directors. Both bills will be considered by the Railroad Committee, and it is not probable that either of them will be reported without considerable modification.

Union Pacific.—The land sales for January were 40,716 acres for $95,581, against 111,712 acres for $388,630 in January, 1884.

There was some trouble at Omaha last week in relation to the new rules recently made by the company, and it was reported that the engineers and other trainmen were ready to strike. The trouble was settled for the present by the withdrawal of the obnoxious rules.

In relation to the recent decision of the Court of Claims the Secretary of the Interior, in a statement submitted to the Senate, says: "Another controversy was as to the deductions to be made from the gross earnings to ascertain the net earnings of the Union Pacific proper under the Thurman act. The United States insisted that certain items, aggregating $2,763,670, between July 1, 1878, and Dec. 31, 1882, should not be deducted, for the reason that the outlay was for the betterment and improvement of the plant. The company insisted that these expenditures were actually made from the earnings, and that the improvement of the plant was incidental and not the purpose of the outlay. The Court of Claims finds as a fact that all the items which make up the $2,763,670 were in good faith paid out of the earnings and were necessary expenses for operating the road and keeping the same in a state of repair, and holds as a matter of law that the word 'necessary,' in the act of May 7, 1878, would include items expended by the company in keeping itself ready and able to respond effectively to the growing demands of an ever-increasing business, and that the company is as much entitled to deduct them under the act of 1878 as under the act of 1862, which has already been considered by the Supreme Court in the case of Union Pacific Railroad Co. *vs.* the United States. * * *

"When the full text of the opinion is obtained and final judgment rendered, the computations herewith submitted may require some change; but if any, they will be of comparatively small amounts, and will be adjusted in subsequent settlements. The following statement shows the amount due from the company to the United States according to the rule laid down by the Court of Claims:

Due from Union Pacific Co., from July 1, 1878, to Dec. 31, 1882	$1,727,742
Deduct 25 per cent of amount claimed by the company for new construction and new equipment to Dec. 31, 1881, $595,359, and 25 per cent of amount claimed for 1882, $95,557	690,918
Balance due the government	$1,036,824
From this should also be deducted the check deposited by the company in the U. S. Sub-Treasury at Boston, Mass., in full to Dec. 31, 1880, and which was not accepted on those terms, but which, by consent of the company, was accepted June 30, 1884, and carried as a credit to the sinking fund	69,358
Total due United States Dec. 31, 1882	$967,466
Due for year ending Dec 31, 1883, excluding expenditures for new construction and new equipment	718,814
Paid in full June 24, 1884	718,814

"The expenditures for new construction and new equip-

ment for the year ending Dec. 31, 1883, amounted to $203,048, 25 per cent. of which is $50,762, by which amount the government is overpaid for that year under the rule established by the Court of Claims. The amount due for the year ending Dec. 31, 1884, has not been ascertained, and the annual settlement was not made Feb. 1, 1885, as provided in the Thurman act. It has not been practicable at any time to make the annual settlement by Feb. 1, as the books of the company are not closed for the year ending Dec. 31 until about the middle of March. These settlements have uniformly been made immediately after the books were closed, and will be for the present year."

Wabash, St. Louis & Pacific.—In relation to the re organization of this company, the Secretary of the committee of the foreign holders of the bonds has telegraphed the following proposition to the American holders of the company's securities:

"1. In the proposed reorganization the new general mortgage bonds, limited to the amount of the existing bonds ($17,000,000), shall be issued in exchange for the present bonds, bearing, however, 5 per cent. interest instead of 6, and depending on the income for the first five years.

"2. Foreclosure rights are to be suspended for this period and will not be exercised for two years after.

"3. The general mortgage bondholders shall have a fair and proper representation on the Board during the income period.

"4. The collateral trust bonds and the floating debt shall be extinguished out of the proposed assessment on the stockholders, and by the new first preference stock to rank after the general mortgage.

"5. That the assessment on the stockholders shall be $8 per share on preferred and $6 on the common shares, such assessment to be represented by the new first-preference stock. The committee, considering the foregoing to be the basis of an arrangement to the interested bondholders, accept and recommend it, and have asked Mr. Joy to come over and attend the meeting of the bondholders at which it will be submitted for approval."

Warren & Sugar Grove.—This company has been incorporated to build a railroad from Warren, Pa., north to the New York line, about 15 miles.

Western & Atlantic.—It is said that the wages of the employés of this road will shortly be restored to the figures ruling before the cut of 15 per cent., which was made last summer. An official order to that effect will be issued in a few days.

ANNUAL REPORTS.

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Pittsburgh & Castle Shannon.

This company owns a line from Pittsburgh to Castle Shannon, 6 miles. The company owns also a considerable coal property, and is a miner and shipper of coal as well as a transportation company.

The equipment consists of 5 locomotives, 8 passenger cars and 438 coal cars. The capital stock is $481,400.

The earnings for the year ending Dec. 31, including receipts from coal sales as well as from the road, were:

	1884.	1883.	Decrease	P. c.
Earnings	$175,259	$201,536	$26,277	13.0
Expenses	155,168	173,213	18,045	10.4
Net earnings	$20,091	$28,323	$8,232	29.3

A dividend of 2 per cent. was paid in 1884, requiring $9,628, and leaving a balance of $10,463. The road was improved by additional ballast and 5,000 new ties.

During the year there were 265,772 passengers carried, an increase of 5.1 per cent., and 2,928,486 bushels of coal (a decrease of 11.2 per cent.) all mined by the company.

Central Pacific.

A preliminary report made by this company for the year ending Dec. 31 gives the following comparative statement of the income account for the year, the figures for 1884 being to a small extent estimated:

Receipts:	1884.	1883.	Inc. or Dec.	P. c.
Earnings of road	$22,166,000	$24,744,421	D. $2,578,421	10.4
Int. on sink. fund	373,000	335,125	I. 37,875	11.3
Settlement with So. Pacific	249,000	7,236	I. 241,764	....
Land Dep't for redeeming bonds	472,000	574,000	D. 102,000	17.8
Total	$23,260,000	$25,660,782	D. $2,400,782	9.3
Expenditures:				
Exps. and rentals	15,695,000	15,570,600	I. 124,400	0.8
Gen. exps., taxes, etc	1,664,000	1,079,670	I 584,330	54.1
Interest paid	3,880,000	3,546,591	I. 333,409	9.4
Total	$21,239,000	$20,196,861	I. $1,042,139	5.2
Surplus	$2,021,000	$5,463,921	D. $3,442,921	63.0
Reduction of debt:				
Sinking funds	1,127,000	1,088,625	I. 38,375	3.5
U. S. requirements	555,000	671,382	D. 116,382	17.3
Land bonds redeemed	472,000	574,000	D. 102,000	17.8
Total	$2,154,000	$2,334,007	D. $180,007	7.7
Surplus or def.	D. $133,000	S. 3,129,914		

The settlement with the Southern Pacific was for the loss on the Colorado Division in 1883. The expenses include extraordinary repairs made necessary by the extensive wash-outs in California, which also largely reduced the earnings by interrupting traffic. The amount credited to the Land Department is only the sum actually received for redemption of bonds, and does not represent the whole receipts in land account.

It would appear that 1884 was the worst year for profits in the history of the road, the whole surplus having been exhausted by expenses, taxes and the requirements of the different sinking funds, including that of the United States. The shrinkage is due in part to the depression in general trade, the opening of other transcontinental lines and more especially to losses from interruptions by floods unprecedented in California. Wheat being sluggish also affected the net receipts.

Utica & Black River.

This company owns a line from Utica, N. Y., to Morristown, 124 miles, and also owns an extension of 10 miles from Morristown to Ogdensburg, although that section is nominally under a separate organization. It leases the Clayton & Theresa, a branch to Clayton on the St. Lawrence, 16 miles, and the Carthage, Watertown & Sackett's Harbor, a branch to Sackett's Harbor on Lake Ontario, making a total of 180 miles worked. The report is for the year ending Sept. 30.

The equipment consists of 25 locomotives; 26 passenger and 14 baggage cars; 381 freight and 5 caboose cars.

The general account is as follows, condensed:

Stock		$2,047,000
Funded debt		1,750,000
Accounts and balances		107,086
Surplus		134,419
Total		$4,038,505
Road and equipment	$3,866,385	
Leased lines accounts	163,413	
Open accounts	8 707	
		4,038,505

Stock was increased $275,000 by the consolidation of the Black River & Morristown, which dated Oct. 1, 1883. The funded debt includes $1,107,000 Utica & Black River 7s, $500,000 Black River & Morristown 7s, and $143,000 Ogdensburg & Morristown 5s.

The earnings for the year were:

	1883-84.	1882-83.	Inc. or Dec.	P. c.
Freight	$506,036	$501,650	I. $4,386	0 8
Passengers	281,130	283,367	D. 2,237	0.8
Mail, etc	47,478	49,118	D. 1,640	3.3
Total	$834,644	$834,135	I. $509	0.1
Expenses	598,513	541,997	I. 56,516	10.4
Net earnings	$236,131	$292,138	D. $56,007	19.2
Gross earn. per mile	4,637	4,634	I. 3	0.1
Net " " "	1,312	1,623	D. 311	19.2
Per cent. of exps.	71.71	64.98	I. 6.73	....

Expenses were increased by extensive renewals, higher taxes and an increase in train service.

The income account was as follows, condensed:

Net earnings, as above		$236,131
Interest paid	$137,140	
Carthage, Wat. & S. H. rental	26,698	
Dividends, 6 per cent	122,820	
		286,658
Excess of payments		$50,527
New buildings, lands, etc		32,285
Total		$72,812
Balance from previous year	$36,529	
Stocks sold, etc	35,708	
		72,237
Balance		$575

Interest paid includes $14,000 on Clayton & Theresa bonds, paid as rental for that road.

A considerable expenditure was needed on the extension to Ogdensburg, and some additional outlay will be required before the road is fully completed and in the condition in which the company desires to maintain its lines.

Lehigh Coal & Navigation Co.

This company owns a great coal property in the Lehigh and Wyoming anthracite regions; it owns the Lehigh Canal from Mauch Chunk, Pa., to Easton, and leases the Delaware Division Canal from Easton to Bristol. It also owns the Lehigh & Susquehanna road from Easton to Wilkes-Barre, 105 miles, with 50 miles of short branches, and leases the Lehigh & Lackawanna, 25 miles; the Nesquehoning Valley road, 17.5, and the Tresckow road, 6.5 miles. These railroads, 204 miles in all, were leased to the Central Railroad Co. of New Jersey, and are now leased, with that road, to the Philadelphia & Reading Co. The figures below are from the report of the managers for the year ending Dec. 31.

The income account for the year is as follows:

	1884.	1883.
Railroads and Nesquehoning Tunnel	$1,458,200	$1,614,695
Lehigh Canal and water power	97,968	86,433
Delaware Div. Canal	58.951	57,745
Net profit on Lehigh coal	370,102	386,354
Royalty, rents, etc	63,330	49,262
Total receipts	$2,048,551	$2,194,489
General and legal expenses	58,461	65,064
Rent and taxes, Nesq. Valley Railroad	97.050	97,050
" " " Del. Div. Canal	69,921	81,438
Taxes	80,078	71,916
Interest account	854,069	934,377
Total expenses	$1,159,579	$1,249,845
Net receipts	$883 972	$944,644

The disposition of the net earning was as follows:

Net earnings		$888,972
Sinking fund, 10 cents on 807,172 tons	$80,717	
Depreciation on coal improvements	76,026	
		156,743
Surplus		$732,229
Dividends, two of 3 per cent. each		718,229
Balance to dividend fund		$14,000

The dividends paid for the year were 6 per cent., against 5½ per cent. in 1883.

The gross earnings of the company's railroad lines were as follows:

	1884.	1883.	Inc. or Dec.	P.c.
Coal	$3,239,907	$3,868,443	D. $628 536	16.2
Freight and express	685.555	682,565	I. 2,990	0.4
Passengers and mails	211,667	224.777	D. 13,110	5.8
Total	$4,137,129	$4,775,785	D. $638,656	13.4
One-third of gross	$1,379,043	$1,591,928	D. $212,885	13.4
Balance to make up guarantee	35,357	.....	I. 35,357	...
Rental received	$1.414,400	$1,591,928	D. $177,528	11.1

The decrease in earnings was wholly due to the falling off in coal shipments and the reduction in rates on coal.

The coal tonnage of the Lehigh Canal and the railroads was as follows,

	1884.	1883.
Delivered east of Mauch Chunk by rail	3,823.161	4,305 167
Delivered east of Mauch Chunk by canal	478,759	429,285
Consumed along the line above Mauch Chunk	132,562	137,034
Delivered to Lehigh Valley R. R., at Packerton	.....	6
Delivered to connecting lines above Mauch Chunk	387,909	280,726
Total	4.822 391	5.152,218

The total decrease was 329,827 tons, or 6.6 per cent. The coal in 1884 came from the following sources: Wyoming Region, 2,434,154; Upper Lehigh Region, Nescopec Branch, 519,952; Hazleton, 33,547; Black Creek, Drifton Branch, 357,819; Beaver Meadow and Mahanoy, 436,252; Mauch Chunk, 969,366; Schulykill Region, 71,301; total, 4,822,391 tons.

The report says: "Our Lehigh coal lands continue to show an increased capacity, having produced for several consecutive months an average of 5,300 tons per working day. The total output for the year was 958,844 tons, notwithstanding the great restriction found necessary throughout the anthracite region to keep down production to the requirements of the market—a restriction which necessitated the suspension of mining during a little more than one-third of the working days of the year. In order to keep up the supply of coal from our property, it has become necessary to commence to make new openings, and new shafts are now being sunk to replace the present slopes at collieries Nos. 6 and 8. The former should reach the requisite depth this year, and should commence to yield coal in 1886, while the latter, the sinking of which has been but recently started, will be a year later in producing coal. It is probable that no further sinking will be required at either of these collieries for many years.

"Our first mortgage loan of $5,381,841 matured April 1, 1884. Holders of $5,000,000 of this loan accepted the privilege of extension to July 1, 1914, with interest at the reduced rate of 4½ per cent., and the holders of the remainder, $381,841, were paid at the maturity of the loan. By this operation the interest charge on $5,000,000 was reduced $75,000 per annum, and the loanholders received so good a security that it commands a rate considerably above par, notwithstanding the lessened rate of interest.

"On Sept. 1, 1884, the agreement with the stockholders of the Nesquehoning Valley Railroad Co. which required us to pay them 7 per cent. dividends expired, and the option was offered them of receiving the par value of their holdings in cash, or of extending the period during which they should receive dividends for 20 years on condition of their accepting 5 per cent. per annum. The large majority chose the latter alternative, and we bought the stock of those holders who preferred to sell it, and now hold $326,350 of that security. It is an excellent investment, for as the Nesquehoning Valley Railroad Co. has no debt whatever, and has no reason for incurring any, the guaranteed dividend is a first lien on a railroad whose net revenues are about $125,500, and are yearly increasing, while the charges against them, including taxes and expenses, are only $70,400; whose earnings are certain to be greatly enlarged in the near future by the transportation of coal from the Schuylkill and Mahanoy regions. This railroad is the only outlet for all our Lehigh coal, and a large and increasing tonnage of lumber, oil and bituminous coal passes over it from the Catawissa Railroad toward the markets of Eastern Pennsylvania, New Jersey and New York. This change in the rate of the Nesquehoning dividend reduced our fixed charges $26,000 per annum.

"To provide means for these payments, and to retire a portion of its floating debt, the board of managers decided to sell some of the securities of the company; and as there appeared to be no immediate prospect of disposing of any considerable portion of the company's stock at par, they decided to take advantage of the easy condition of the money market and the excellent credit of the company to sell some of its bonds. The company owned $1,122,000 of the consolidated mortgage loan due 1911, which commanded a considerable premium, but they thought it unwise to sell any more 7 per cent. securities, and decided to execute a general mortgage to cover a loan bearing a lower rate of interest, covenanting at the same time to make no further issue under the consolidated mortgage. In 1871 the managers had decided to limit the bonded indebtedness of the company to $15,000,000, and the consolidated mortgage loan was fixed at that amount, including all prior liens. When, in 1873, the company's lands in Wyoming Valley, which were a part of the security for that loan, were sold, the amount of the loan was decreased by $2,064,000, and the limit of the company's bonded indebtedness was thus reduced to $12,936,000. Since that time there has been expended on new railroads and for double-tracking the main line of railroad, $2,322,787; coal lands to the extent of 1,430 acres have been purchased, at a cost of $1,144,000, not including the purchases of the last three years, and $290,774 have been expended in developing the coal property from a capacity of 500,000 tons to a capacity of 1,000,000 tons. Omitting the purchases of coal lands made since 1874, which lands are not covered by the general mortgage, and deducting the incumbrances remaining on the 1,430 acres above mentioned, there has been spent on the property in the last twelve years $3,114,561, during which period the income increased from $1,412,000 to $2,016,000.

"These conditions seemed an ample justification for replacing the limit of the bonded debt at the original amount of $15,000,000, which was done; a general mortgage was executed, and $1,000,000 bonds, bearing interest at the rate of 4½ per cent., were issued and sold. This furnished means to buy up the unextended portions of the 1884 loan, and of the Nesquehoning Valley Railroad Co.'s stock, to pay off the last installment of the Delaware Division scrip, amounting to $113,639, and to reduce the floating debt about $216,000. It was a most fortunate circumstance that all the negotiations necessary to place our indebtedness on so favorable a footing were completed before the occurrence of the financial disasters of last year. We shall have no more loans maturing for several years, the first one being the Greenwood mortgage in 1892.

"The full benefit of the reductions of fixed charges recited above was not felt in 1884, as the change in the Nesquehoning dividend did not at all affect the payments in that year, and the lessening of the rate of interest on the 1884 loan only applied to three-quarters of the year.

"By the terms of our agreement with the Delaware Division Canal Co., we have the right, whenever the holders of three-quarters of the stock of that company shall have exchanged their stock for the stock of this company as provided by the agreement of Feb. 1, 1879, to give notice that all other holders desiring to make such change shall do so within one year, after which time the privilege shall cease. We acquired and exercised this right March 10, 1884, giving the requisite notice that the privilege of conversion would cease March 10, 1885, and from present appearances it seems likely that nearly, if not quite, all of the holders will exchange their stocks for ours. * * *

"With the end in view of increasing the business of our railroads and also of supplying tonnage to our navigation system, we urged the Receivers of the Philadelphia & Reading Railroad Co. to build a short link of railroad between our Nesquehoning Valley Railroad and the East Mahanoy Railroad, to furnish an outlet for anthracite from the Mahanoy region over our transportation lines toward New York; and, finding that they had no funds for this purpose, we ourselves undertook, and have nearly completed, the construction of the 3½ miles of railroad required to make the connection, at a cost of about $58,000. This will furnish a route from the Mahanoy region which should command a large business, as its grades are exceptionally favorable, and it is nearly 50 miles shorter than that by which coal is now transported from the eastern end of the Mahanoy region to New York. * * *

"Our relations with the Philadelphia & Reading Railroad Co., operating our railroads by virtue of the agreement of May 29, 1883, have been entirely satisfactory. The payments of rental have always been promptly made, and every disposition has been shown by the lessee to carry out those portions of the agreement which require them to develop the business of our railroads."